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THE BRITISH

SEA-ANEMONES

AND

CORALS.

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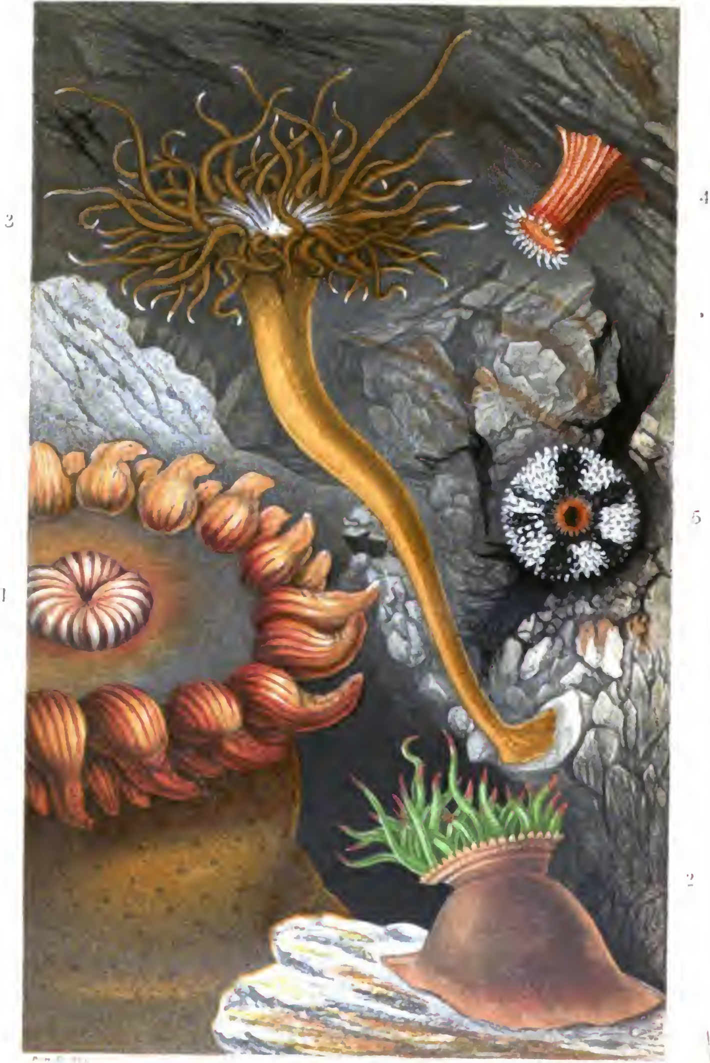

1 BOLOCERA TUEDIÆ
2 ANTHEA CEREUS
3 AIPTASIA COUCHII
4 SAGARTIA COCCINEA
5 S. TROGLODYTES

ACTINOLOGIA BRITANNICA.

A HISTORY

OF

THE BRITISH

SEA-ANEMONES

AND

CORALS.

WITH COLOURED FIGURES OF THE SPECIES
AND PRINCIPAL VARIETIES.

ASTOR LIBRARY
NEW-YORK.

BY

PHILIP HENRY GOSSE, F.R.S.

LONDON:
VAN VOORST, PATERNOSTER ROW.
1860.

PREFACE.

In writing the following pages, I have laboured to produce such a "History of the British Sea-Anemones and Corals," as a student can work with. Having often painfully felt in studying works similar to the present, the evil of the vagueness and confusion that too frequently mark the descriptive portions, I have endeavoured to draw up the characters of the animals which I describe, with *distinctive precision*, and with *order*. It is said of Montagu that, in describing animals, he constantly wrote as if he had expected that the next day would bring to light some new species closely resembling the one before him; and therefore his diagnosis can rarely be amended. Some writers mistake for precision an excessive minuteness, which only distracts the student, and is after all but the portrait of an individual. Others describe so loosely that half of the characters would serve as well for half-a-dozen other species. I have sought to avoid both errors: to make the diagnoses as brief as possible, and yet clear, by seizing on such characters, in each case, as are truly *distinctive* and *discriminative*. Further to aid the student, I have given the characters in a regular and definite *order*, so that he may at a glance compare species with species, or genus with genus, in their several parts and organs.

In this I have received little aid—I may say almost literally none—from my predecessors. The "History of British Zoophytes" by Dr. Johnston has hitherto been the English naturalist's only guide to the study of these creatures; and notwithstanding the value of this work in many points, the almost utter worthlessness of their specific characters has been often confessed. That excellent zoologist lived on a coast where the Anemones are feebly represented; and hence his personal acquaintance with species was very small, or the result would doubtless have been different.

The elaborate "Histoire Naturelle des Coralliaires" of M. Milne-Edwards is liable to the same objection. A work of immense research, labour, and patience, it bears evidence in every page of being the produce of the museum and the closet, not of the aquarium and the shore. With those species which possess no stony skeleton, the learned author evidently had no acquaintance,—or next to none;—and hence he has merely reproduced the words of his authorities in all their vagueness; while the distribution of the species into genera and families appears so full of manifest error to one personally familiar with the animals in a living state, that I have not attempted to follow his arrangement.

I have been compelled, therefore, to draw up the characters of my subjects *de novo;* and in doing so I have resorted to nature itself; I have studied the living animals. For the last eight years I have searched the most prolific parts of the British shores,—the coast of Dorset, South and North Devon, and South Wales; and have moreover, as the following pages show, had poured into my aquaria the productions of almost every other part of our coasts,—from the Channel Isles to the Shetlands. For these last I am indebted to the kindness of many zealous scientific friends, whose names appear in this volume, and to whom I here express my grateful obligation; especially distinguishing Mr. F. H. West of Leeds, and the Rev. W. Gregor of Macduff, as pre-eminent in their contributions.

The result is that seventy-five species find their places in these pages, five of which are merely indicated, leaving seventy good species, exclusive of the *Lucernariadæ.* Of these twenty-four only are described in Johnston,—the rest of his species being either synonyms or resting on insufficient evidence. Fifty-four British species have been examined by myself, perhaps a larger number than have come under the notice of any other naturalist; by far the greater part in life and health; and thirty-four of these have been added to the British Fauna by myself.

A new feature in works of this sort, which will strike the student, perhaps needs a word of explanation;—I mean the distinguishing of the prominent *varieties* of each species by a diagnosis, and the assigning of a trivial name to each. Considering the variability of many of the forms, I trust the convenience of this procedure will excuse the innovation.

The *analytical tables* of the families, genera, and species, hitherto scarcely known in English zoological works, will, I think, be found useful; nor will the attempt to tabulate the geographical distribution of the species be devoid of interest to the philosophic student.

The plates must speak for themselves: they have been printed in colours by Mr. W. Dickes, who has spared no effort to make them, as nearly as possible, fac-similes of my original drawings, which were made from the life.

Nearly two years have been occupied in the progressive publication of the work, as it has been issued in bi-monthly parts. Advantages and disadvantages attend this mode of publication. Among the former may be reckoned that the information is brought down to the latest period, and that the successive parts stimulate the zeal and co-operation of fellow-labourers; the book thus embodying the knowledge of many, rather than of one. Among disadvantages must be put down, incongruities between the earlier and the later portions, statements made and opinions hazarded which are subsequently corrected, and omissions which are finally supplied. For these defects the author must cast himself on the kind consideration of his readers, who must be aware that no branch of science is at one stay even for a single month.

My labour has been performed *con amore;* I have looked forward to it for many years past; and it is with no small gratification that I see it completed. I send forth the result as one more tribute humbly offered to the glory of the Triune God, "who is wonderful in counsel, and excellent in working."

P. H. GOSSE.

TORQUAY, *December*, 1859.

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INTRODUCTION.

THOUGH the following "History of the British Sea-anemones and Corals" is intended for general readers, it seems desirable that it should be accompanied by a brief *résumé* of what is known concerning the anatomy and physiology of this order of animals. I have commenced the text of the work with a general description of the constituent parts of their bodies, in order to establish a determinate orismology for the class, and shall here assume that the reader is sufficiently familiar with the various organs, and the terms by which they are indicated.

The Sea-anemones present a low grade of animal existence, and are commonly represented as exceedingly simple in structure. The term "Animal-flowers," by which they were known to the early observers, and which has been perpetuated in the Greek equivalent "ANTHOZOA," applied to the class by some modern naturalists, has been thought to express the fact, that a vegetable type of organization is scarcely less proper to them than an animal one. It is, however, to the accidental resemblance which these beautiful forms often bear to a highly-coloured and many-petaled flower, that the name owes its appropriateness, rather than to any close assimilation to the vegetable structure. The Sea-anemone is an indubitable animal, and its organization is more complex than is usually supposed. This will be seen as we proceed with the successive examination of the organs.*

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* In all cases in which I do not adduce any other authority, the following statements may be considered as given on the authority of my own dissections and observations.

1. *Tegumentary System.* The skin is sufficiently distinct. After a few hours' maceration in fresh water (*Sag. bellis*), the epithelial and pigmental cells are easily removed with a hair-pencil, leaving the outer layer of muscular fibre bare. If the specimen be immersed in spirit for a day or two (*A. dianthus*), the integument may be separated in flakes, which, under the microscope, are seen to be composed of a multitude of short corrugated fibrillæ, set in no definite direction, interspersed with clear granules, pigment grains, and cnidæ.

An examination of the living animal (*dianthus, bellis, crassicornis, Halc. chrysanthellum, Cor. viridis*, &c.) shows that the skin is composed of three elements, though these cannot always be separated. A layer of epithelial ciliated cells forms the first tunic: these are constantly in process of being thrown off from the true skin, in the form of mucus; but in some cases (*Phellia, Edwardsia*) they entangle foreign matters, and retain their cohesion as an investment more or less dense, and more or less firmly adherent to the skin. Below this is the true skin, of a more granular character, and carrying, imbedded in its thickness, a multitude of cnidæ, whose discharging points are directed outwards. Intimately connected with this layer, but still lying sufficiently beneath it to be regarded as a distinct stratum, are the pigment-cells, which impart the colours to the animal.

The tentacles of *Aiptasia* and *Anthea* (less conspicuously also of *S. bellis*) are lined with a dense layer of cells, forming to the naked eye a dark brown lining. Some peculiarities of these cells I have detailed (at page 167, *infra*): it is probable that this layer may have some special function yet unrecognised.

2. *Muscular System.* In most species the muscular framework of the body is beautifully distinct, and the tissue is readily isolable. The column is a cylinder of muscular tissue, consisting of two layers, the outer composed of transverse, the inner of longitudinal, fibres. The transverse fibres are the more strongly marked: they average about ·0001 inch in diameter, and are never striate.

The cylinder which forms the column, is closed in most species by two extremities, which are flat, like the top and bottom of a tin canister: the former is the disk, the latter the base. Each of these is but a continuation of the same two layers of fibre that compose the column-wall,—the outer transverse fibres becoming concentrically circular; the inner longitudinal ones converging to, or towards, a centre. In general, the boundaries of these divisions are distinctly marked by an abrupt angular change of the direction of the inner fibres; but in some species (ILYANTHIDÆ, *Turbinolia*, &c.), the body tapers gradually to a point below, without any angular change of direction.

The fibres of the inner layer meet at a central point in the base, except in those species which have a central foramen there; but in the disk they sustain another change of direction, bending abruptly down at right angles, so as to form an inclosure in the axis of the column, parallel to the outer wall—the fibres of the outer layer still coating them. This downward prolongation forms the stomach, which will be presently described.

In *T. crassicornis* the angle which is formed by the inbending of the fibres to form the disk, is strengthened by a muscular cord, about half a line in thickness, consisting of annular fibres, and evidently acting as a sphincter: it is this band that forms the parapet.

In *Sagartia* (*bellis*, *miniata*, *nivea*, &c.) the muscular tunic, in contraction, corrugates into a reticulate or honeycomb-like pattern, inclosing shallow cells of much regularity. It is, I think, these inclosed areas, any one of which may be considered as a cell, with perpendicular walls of muscular tissue, that constitute the sucking warts, by means of which minute fragments of shell or gravel are grasped, and retained with considerable force. If this exposition is correct, all of the corrugated cells are capable of becoming suckers at the will of the animal; but, in fact, only a few are so used at a time. The cells (*nivea*, *miniata*) are about ·014 inch in depth and longitudinal diameter, while their transverse diameter may average about ·084 inch. It is the outer layer of muscles that constitutes these corrugations.

The sucking warts in the *Bunodidæ*, are of similar character; but here the elevation of the muscular tunic is more permanent, and the walls of the individual cells are thicker, and are incurved towards each other.

To the muscular system belong the *Septa*. These are thin plates of muscular tissue, comprising the two layers of transverse and longitudinal fibres, doubled on each other, and stretching vertically through the cavity inclosed by the column. Each principal septum (Plate XI. fig. 1, *a*), in any of the normal species, is inserted, by its outer edge, into the column-wall throughout its entire height; by its lower edge, into the base, from the wall to the centre; by its upper edge, into the disk, from the margin to the mouth; and, by its inner edge, into the stomach, from the lip, almost to the free bottom of that viscus. From thence the inner edge recedes with an arching outline, and is free, until it is gradually merged in the lower edge at the centre of the base. Between these primary septa, others are developed in succession, partitioning off the imperfect chambers thus formed. But the septa of each successive cycle, while still inserted in the column-wall throughout, spring from the stomach at higher and higher points, and terminate at points more and more remote from the centre of the base. The number of septa depends, to a certain limit, on the age of the individual, but in *Peachia* it never exceeds twelve, and in *Halcampa microps*, eight.

In *Peachia*, the tissue of the septa is very dense, and still more so in *T. crassicornis*, where it assumes a firmness almost cartilaginous, and a decided blue colour.

The muscular tissue of the disk protrudes in the form of hollow cones, which are the *tentacles:* each of these springs from an interseptal chamber, and hence their development is in cycles corresponding to that of the septa. The fibres which compose their walls are very delicate.

3. *Nervous and Sensory System.* I have been as unsuccessful as my predecessors, in my search for nervous threads or ganglia; still, I have little doubt that such exist. I should expect their presence in the form of a ring, surrounding the mouth, perhaps with a pair of ganglia at the gonidial tubercles, distributing threads to the tentacles. I have never observed any trace of auditory vesicles or otolithes, nor any organs that I could regard as eyes; not even in the rudimentary form of those aggregations of pigment-cells, that occur on the margin of the Naked-eyed Medusæ. A delicate sense of touch certainly exists, distributed over the entire surface, but specially localized in the lips and the tentacles. The occasional elongation of one or more of these latter organs, and their employment (as described at pp. 34—36, *infra*), indicate the existence of an active tactile faculty, and not merely of passive

irritability. The tips of the tentacles are bristled with the minute points, called by Dr. T. S. Wright *palpocils*,* which he considers as delicate tactile organs. These are specially conspicuous on the globose heads of the tentacles of *Corynactis* and *Caryophyllia*. I am not sure whether I ought to regard, as an organ of taste, the surface of the lower part of the stomach, which in *T. crassicornis* I find covered with innumerable papillæ, not quite uniform in size or shape, some being more pointed, others more round, and averaging about ·0003 inch in diameter.

4. *Digestive System*. This is very simple, consisting essentially of a short tube descending from the centre of the disk, with an open extremity hanging loose in the body-cavity (Plate XI. fig. 1, *c*). I have already observed that the inner edges of the septa are inserted into its outer wall, and these maintain it in place, while by their transverse contraction they can draw asunder its surfaces, and by their longitudinal contraction they can either lengthen or shorten it. The stomach-wall itself, however, is muscular; possessing at least the layer of transverse fibres, though I have not quite satisfied myself of the presence of the longitudinal layer.

The form of the stomach is not that of a cylinder, but of a flattened sac, or of a pillow-case unsewed at both ends. This form may be well seen in pellucid specimens of *A. dianthus*, and in the smaller ILYANTHIDÆ, and it may be examined by dissection in others. The excessive contraction of the parts, and the copious excretion of mucus, do, however, present great obstacles to satisfactory demonstrations under the scalpel. I have therefore resorted to accessory means. A specimen of *T. crassicornis* fully expanded I treated with laudanum, drop by drop. It immediately expelled the water contained in the tentacles, causing these organs to shrink and shrivel, but not retracting them. The mouth, which had been pursed together, began slowly to open, and dilated greatly, almost to the concealment of the tentacles, the summit of the now flattened animal being almost wholly occupied by the gaping orifice. An excellent opportunity was thus afforded for examining the structure of the stomach, which was revealed without the excretion of mucus. The languor, too, induced by the narcotic, allowed the parts to be freely touched with instruments without much effort at contraction.

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* See Edin. New Phil. Journ., April, 1857.

The gular tube is remarkably corrugated longitudinally, the folds being so full, that a transverse section would present a series of figures 8. In the present state of contraction there were horizontal corrugations also. At a short distance below the mouth the stomach ends abruptly, the edge, thin and delicate, hanging freely like a much folded curtain into the cavity. At each angle of this flattened sac the gonidial groove was conspicuous from top to bottom, inclosed by two slender columns of the firm cartilage-like muscle.

The diameter of the digestive tube is, when at rest, not greater than that of the mouth; indeed, the walls are in contact; nor, so far as my observation extends, are they ever separated except for the reception of food.

It has been customary to represent the stomach as a sac pierced at the bottom "by one or more valvular openings which communicate with the cavity of the body."* But the case is as I have stated it: the free folded membrane hangs perpendicularly; nor is there any thickening of the edge, nor any structure which at all resembles a sphincter. In tall specimens, I have observed, through the semi-transparent integuments, food pass into the stomach, and have marked that the morsel is invariably retained, never passing through to the general cavity; but I am persuaded that this is effected by the common contractility of the walls, and not by a sphincter.

When morsels of food, such as fragments of butchers' meat, are swallowed by Anemones, they are retained for some hours, and then vomited; and because little change has passed upon the solid parts it has been rashly concluded that no process of digestion takes place in these animals. On this foolish hypothesis it is difficult to see why food should be swallowed at all, or what need the animal has of mouth or stomach. Their ordinary food, however, is not mammalian muscle, but the far softer and more fluid flesh of *Crustacea*, *Mollusca*, and *Annelida*. Nothing is more common than to find large specimens of *A. mesembryanthemum* or *T. crassicornis* discharge, soon after their capture, the shell of a crab, or a limpet, from which the entire flesh has been removed and replaced by a tenacious glaire. No doubt the first part of the process consists largely of maceration, and continued pressure, by means of which the juices of the food are extracted.

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* Siebold's Comp. Anat. § 37. "The stomach with its circular aperture at the base" (Teale). Johnston, indeed, denies it any aperture at all:—"There is no — other visible exit from the stomach than the mouth."

The nutritive matters thus obtained are then subjected to the action of the bile. No anatomist, I believe, has as yet attributed a *liver* to these animals, but I have little doubt that such is the character of a structure which I am about to describe. In *dianthus*, crassicornis, Peachia undata, and others, the stomach-wall is lined on the interior side of its upper portion (the side, I mean, which is within the interseptal chambers) with a thick highly-coloured substance. In the first two named this is yellow or orange, in the last salmon-red. This lining is (*dianthus*) about half a line in thickness, of a pulpy tissue, arranged in irregular lobules, covered with a ciliated epithelium (Plate XI. fig. 1, *d*). On being crushed down, the pulp is found to be composed of a nearly uniform mass of yellow fat-cells, the largest of which are about ·0003 inch in diameter, and the smallest immeasurable points. Cnidæ occur numerously in the true stomach-wall, but none in this lining-coat. I am justified, then, in presuming this organ, from its colour, form, position, and structure, to be a *liver*.*

In *Aiptasia* I find what I think an analogous structure, but with a slightly varied position. The septa, instead of being inserted into the stomach-wall from the point where they spring off to the summit, recede from it at their upper part, where their edges carry rounded pulpy lobes, which under pressure consist of a clear tenacious sarcode, carrying a moderate number of brown pigment-cells. The sarcode is composed of globose cells, averaging ·0005 inch in diameter, each containing more or fewer oil-globules, averaging ·0005 inch, but some attaining ·0003. These are very numerous in the mass.

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* As an example of the need of caution in such observations as these, I may be pardoned for mentioning the following circumstance:—While viewing the surface of the pulpy tissue above described under a good reflected light with a power of 133 diameters, I saw it forming irregular lobes, with deep narrow sinuous depressions. Over the surface, and chiefly following the lines of the sinuosities, I noticed meandering white lines, like very slender branching threads. The thought that I had discovered veritable nerves immediately occurred to me; but turning the mirror of the microscope to test the observation with a different angle of the light, I found I had been looking at merely *the light reflected from the edge of the smooth lobules!*

5. *Circulatory and Respiratory systems.* These exist in so simple a condition that we can scarcely separate them in our investigations. Dr. Williams has distinguished by the term *Chylaqueous fluid*, "that fluid which occupies the gastric and perigastric cavities of all animals below the Annelida."* It is far less vitalized than true blood, but still it is not mere water, being impregnated with organized corpuscles and slightly albuminized. In the animals of the class before us there is no blood, and no vascular system, but the cavity of the body is ample, and is copiously occupied by a transparent fluid, which has by some been mistaken for sea-water. I have, however, proved by experiments, recorded elsewhere,† on numerous species, that this fluid is copiously provided with organic corpuscles, circular or ovate disks, granulose in character, of a clear yellow colour, varying from ·0001 to ·0008 inch in diameter, the larger ones inclosing oil-globules. The fluid coagulates on the addition of nitric acid, showing that it holds albumen in solution.

It would appear that the action of the stomach is confined to the solution and extraction of albumen and oil, which are carried with sea-water into the general cavity, the compound being a chylaqueous fluid; and that it is in the upper part of the interseptal chambers that it is acted upon by the biliary secretion.

For the free circulation of this fluid to every part of the interior, the whole body is lined with a delicate, strongly ciliated epithelium. The ciliary current is upward: when a pellucid *dianthus* has its fosse much exposed, it is quite easy to see the current driving up from every part of the interior along the whole inner wall, and passing into the tentacles, up which the atoms are then hurled. I believe there is no change in the set of this current: for though atoms are seen, especially at the bottom of the tentacles, occasionally to pass annularly or diagonally; and though of course there must be a return of the fluid driven upward—for there does not appear, with the closest watching, a trace of exit at the tip of the tentacles; and though, indeed, atoms are seen, though rarely, to pass downward,—I think these irregular and retrograde movements are merely the mechanical result of the impact of the ciliary current on the closed tip. If so, the current runs upward on the whole inner surface of the walls, and then returns down the centre. And this, I am persuaded, is the case.

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* Phil. Trans. 1852.

† Annals of Nat. Hist.; March, 1858.

That the tentacles are perforated at the tip is, however, certain: but it is closed or opened at the will of the animal, the outer annular layer of fibres acting as a sphincter. Nothing is more common than to see a fully expanded individual of *T. crassicornis*, when suddenly alarmed, eject slender streams of water from the tips of its tentacles; and I have seen an instance in which, the animal being but just covered with water, the jets were projected to a height of three inches above the surface. In *S. bellis*, after maceration, the slightest pressure on these organs causes the pigment to ooze out at the tip. In many that I so treated, not one allowed it to escape at the side; nor in any case was there the least appearance of resistance, suddenly yielding as if by a rupture; nor did the aperture in any case enlarge, nor was it in any case otherwise than at the precise extremity. From which circumstances I infer a natural foramen there; and think that it exists in all species, except those (as *Corynactis* and *Caryophyllia*) which have a globose appendage at the extremity of the tentacle.

The circulation of the nutrient fluid is aided by a curious apparatus of foramina, of which I have met with no description. It is difficult to find them in dissection, for they appear to close with contraction; but in *bellis*, on making a transverse section just below the disk, I have found a small round aperture in each primary and secondary septum, through which I could thrust a probe without laceration. It is during life, however, that, under certain favourable circumstances (for they cannot at all times be detected), they must be studied. In *dianthus*, when very much distended, I have seen the principal septa perforated with a large circular foramen in the midst of their broadest part, resembling iron girders supporting a floor, excavated for lightness (Plate XI. fig. 1, *b*). In *Anthea cereus* they are conspicuous;* but I have been unable to detect them in *T. crassicornis* or in *Corynactis*.

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* The most satisfactory observations I have made on these perforations were on a specimen of *Anthea cereus*, var. *sulphurea*. Being very much expanded, and distended to translucency, the base adherent to the side of a glass tank, the column greatly exceeding the base, the window opposite,

That the function of Respiration should be widely diffused and very simple in these animals will follow from what has been said. The chylaqueous fluid, consisting largely of sea-water admitted freely from without, is itself a reservoir of oxygen, and thus its organized elements are perpetually aërated. We have already seen how the ciliary currents within maintain a constant succession of the bathing fluid upon every part; and there can be no doubt that some mode of exit is provided for the effete water. What this is, however, I know not. In *Cerianthus*, which has a posterior foramen to the body-cavity, I have seen the water forcibly ejected from this aperture (see *infra*, p. 272); I have also marked a sudden *jet d'eau* from the disk (probably from the mouth, but of this I was not sure) of *T. crassicornis*, which shot up some mucous shreds with force to the surface, a height of some five inches. Perhaps these expulsions, and those from the tentacle-tips already alluded to, may be set down as so many expirations (perhaps periodical) of deoxygenated water.

Ancillary to respiration, as renewing the water in the vicinity of the animal, is the ciliation of the external surface. This is strong and uniform on the tentacles, but I have never been able satisfactorily to trace it on the column. It is first visible at the margin, flowing in an even current up the tentacle, on every side, from the foot to the

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I saw with a lens, for an hour together, with the utmost distinctness, a small circular (oval in perspective) foramen in each septum. That is, I saw them in a dozen or more successive septa, without interruption. The diameter of the foramen was about the same as that of a tentacle near the tip, in its ordinary state of extension. That the foramina were in films whose surfaces were coincident with the line of vision, and not transverse to it, I proved, by moving my eye to the right and left, by which the foramen became more and more round, or more and more linear, the line in the latter case being that of the axis of the column. Hence they must have been in films running from the column-wall towards the axis perpendicularly, as regards the position of the animal;—conditions which agree with the septa, and with them only.

The next day, with a very favourable sight, I traced the foramina consecutively for half the circumference of the animal. In this space there were 49 septa (perhaps one more than the half, for I bisected only with my eye); and I found that the foramina are pierced through those which are entire (by far the greater number), but that the series is interrupted irregularly by those imperfect septa, which span the cavity like an arch. The latter were invariably two together, differing much in the height of the arch, and graduated in this respect. The detail of the numbers of the consecutive septa, in the half-animal, stands thus:—

Perforate—	13	.	2	.	10	.	4	.	2	.	2	.	2	.
Imperforate—	.	2	.	2	.	2	.	2	.	2	.	2	.	2

tip, where it passes off. *Balanophyllia* presents an exception to this rule, which I have found to hold good in all other examined cases. In this instance, the tentacles, which are densely clothed with palpocils, seem to me destitute of external cilia, while all the scarlet parts are furnished with these latter. The ciliary currents flow *down* the sides of the column, and *up* the conical mouth from the whole circumference of the disk.

6. *Reproductive System.* The ACTINARIA increase by spontaneous fission, by gemmation, and by generation. Fission takes place either by a longitudinal division of the entire animal from above downwards, or by separation of small fragments from the edge of the base, which soon develop themselves into minute and apparently young individuals. The former mode appears to be not uncommon with *Anthea cereus* (see *infra*, p. 169); and an imperfect form of the same produces double-disked individuals of *Actinoloba* and *Actinia*. The latter mode is common with several of the *Sagartiadæ* (see pp. 19, 66, 86, 110).

Gemmation,—the production of buds from the parent individual—occurs largely in the order before us, but principally in those which have a stony skeleton. According to Mr. Dana, whose classification I have followed, the ASTRÆACEA always bud from the disk, the CARYOPHYLLIACEA invariably from the side or base. But a specimen of *A. dianthus* has come into my possession,—through the kindness of L. Winterbotham, Esq. of Cheltenham,—which has two young individuals projecting one from each side, at about mid-height,—an indubitable example of lateral gemmation. The animal has continued in the same condition for nearly a year, with no tendency to separate its progeny.

Generation is of course the normal mode of increase of the race. The sexes are sometimes united in one individual (*S. troglodytes,* p. 100); sometimes separate (*Stomphia Churchiæ,* p. 225). The testes and the ovaries cannot be distinguished from each other by a cursory examination; each consists of a pulpy mass, usually of an orange or pale salmon-colour, attached to the free edges of the septa. The peritoneal membrane which invests each side of the septum is produced beyond the muscular layers in the form of a mesentery of two films in contact (Plate XI. fig. 1, *e*). At some distance from the edge of the septum, the films separate, and inclose the reproductive organ (*f*), uniting again beyond it into a second mesentery (*g*), which is bounded by the craspedum (*h*) presently to be described. Both mesenteries are full and plaited, especially the craspedal one.

The spermatic fluid is discharged in a turbid cloud through the mouth, and is diffused through the surrounding water (pp. 99, 100). The ova are also discharged through the mouth, or through the gonidial grooves (pp. 97, 98, 99). The development of the egg is into an infusorium-like germ, differing in shape in different species, but always covered with vibratile cilia, and freely locomotive. Examples of the occurrence of these will be found *infra* (*passim*), and many highly interesting details have been recorded in the magnificent works of Sir J. G. Dalyell. The manner in which the development of the Anemone proceeds has been illustrated by Dr. Cobbold;* a depression in the surface of the globose embryo becomes the general cavity; the edges then become incurved and descend into the cavity, forming the stomach; septa spring from the inner wall, beginning from the summit and extending downwards, and tentacles bud from around the mouth. Eggs, germs, or fully formed young, are discharged indifferently through the mouth: in the latter two cases the embryos have passed their earlier developments within the general cavity.

7. *Teliferous System.* In common with some nearly allied forms the ACTINARIA are furnished with a system of armature of most extraordinary character. It is comparatively a recent discovery that their tissues contain excessively minute bodies, in the form of oblong or oval transparent vesicles, which have the power of shooting out a long thread of extensive tenuity. Wagner first drew the attention of physiologists to these organs, though he mistook their functions for that of spermatozoa; an error which was participated by Dr. Wyman, in his observations recorded in Dana's magnificent work on Zoophytes. Their true character has, however, been sufficiently established by many observers, including Wagner, Erdl, Quatrefages, Kölliker, Agassiz, and myself. These bodies I have called *cnidæ*, or thread-cells.

The *cnidæ*, in the Actinoïd Zoophytes, are not confined to one organ or set of organs. They are found in various tissues, and in different regions of the body. They abound in the walls of the tentacles, in the marginal spherules (of *Actinia* proper), in the corrugated integument that surrounds the mouth, in the walls of the stomach, and in the epidermic mucus that is thrown off from these last-named parts on the stimulus of irritation. But there are certain special organs in which they are crowded to an extraordinary degree, and which, so far as I know, have no other function than that of being magazines of the *cnidæ*. These organs are of two kinds, which I have designated respectively as *craspeda*, and *acontia*.

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* Annals Nat. Hist. for Feb. 1853.

The *Craspeda*. The peritoneal membrane of the septa, having formed, by the contact of its two laminæ, a kind of mesentery, separates again to inclose the ovary; again unites into a second mesentery, the edge of which is greatly puckered, and thickened in the form of a cylindrical cord, closely resembling the bolt-rope of a ship's sails, or still more the cording in the hem of a flounced garment. This marginal cord, bound throughout its length to the ovary, or to the septum, by a mesentery, I call the *Craspedum* (Plate XI. fig. 2).

So far as my examinations have gone, the *craspeda* are found in all ACTINARIA, and for the most part in great profusion. In *T. crassicornis*, for instance, they constitute an inextricable tangle of white frilled cords, seen everywhere below and behind the stomach, and protruding through every wound of the integuments. The thickness of the cord does not, as has been stated, "increase from above downward." Nor does it "terminate in the coats of the stomach:" if we gradually cut away the stomach, piecemeal, until the free edge has disappeared, we still find the *craspeda* bordering the mesenteries of the *septa*, until the latter are lost at the point of their convergence in the centre of the floor of the visceral cavity.

The craspedum, under pressure, displays the following elements. (1.) A clear, colourless, highly refractile sarcode, which, under extreme pressure, has a tendency to draw out into strings, and long-tailed drops, like a thick oil on a wetted surface. (2.) Minute scattered granules, very irregular in shape. (3.) Mulberry-like aggregations of granules, of a clear yellow hue, compactly built together, and firm, which have the appearance of being inclosed in a definite cell-wall. These are generally ovate, but are somewhat irregular in form. (4.) Cnidæ, in greater or less abundance, according to the species. As the *craspedum* flattens under pressure, these are crowded at the edges, and are seen to be arranged, more or less distinctly, side by side; their long axes set at right angles to the axis of the *craspedum*, and their emitting extremities either close to its edge, or projecting from it. The more dense their aggregation, the more definitely is this arrangement maintained; doubtless because displacement of their original position is more readily effected by the flattening action of the compressorium, when the *cnidæ* are more loosely scattered in the fluid *sarcode*. The peritoneal membrane which invests the whole is richly ciliated on its entire surface. (Plate XI. fig. 3.)

The *Acontia*. Certain species of the Zoophytes under consideration have the faculty of shooting forth from the mouth, as well as from minute orifices scattered over the surface of the body, slender flexible filaments, usually of an opaque white hue, but sometimes, as in *Adamsia palliata*, of a brilliant lilac tint. In some instances, as in *Sagartia parasitica*, *S. miniata* and *Adamsia palliata*, these threads are protruded in great profusion, coiled up in irregular spirals, and forming tangled masses that resemble bundles of sewing cotton. It appears to be a means of defence; and any of the species just mentioned may readily be excited to display these weapons by a slight irritation of the surface of the body. The slightest touch is usually a sufficient stimulus to the extension, which will often continue to proceed for some time, the filaments shooting forth from various points with great force and rapidity. They have a strongly adhesive power, which, however, is not dependent on any superficial viscosity, but on the projectile power of the contained *cnidæ*, of which I shall presently speak.

If we carefully watch one of these threads, we shall perceive that after a time it is gradually withdrawn again into the body, by the orifice at which it was protruded. In the case of *S. parasitica*, a large species, these filaments, which I designate by the term *acontia*, sometimes extend six inches from the body, in a straight line. Yet in a few minutes the whole has disappeared. It is gradually corrugated into small irregular coils, at the end which is attached to the animal; and these little coils are, one after another, sucked in, as it were, through an imperceptible orifice.

Acontia are less universal than *craspeda*, for whereas the latter are always present, so far as I know, in this order, the former are found only in the *Sagartiadæ*, and perhaps in the *Bunodidæ*. In *Sagartia bellis* they spring from the mesenteries that carry the *craspeda;* generally two *acontia* from each mesentery, and most frequently in pairs. Their point of insertion may be anywhere in the length of the mesentery, great irregularity prevailing in this respect.

Though at first it seems a solid cylinder, the *acontium* is really a flat narrow ribbon, with involute and approximate edges, which can at pleasure be brought into contact, and thus constitute a tube (Plate XI. fig. 4). Like the *craspedum*, of which it seems to be a form modified for a special use, its surface is richly ciliated; and the ciliary currents not only hurl along whatever floating atoms chance to approach the surface, but cause the detached fragments themselves to wheel round and round, and to swim away through the water. Though there is not the slightest trace of fibrillæ in the structure of the *acontium*, even under a power of 800 diameters, the clear *sarcode*, of which its basis is composed, is endowed with a very evident contractility.

Under pressure, the edges of the flattened *acontium* appear to be thronged with clear viscous globules, overlapping one another, and protruding; indicating one or more layers of superficial cells, doubtless forming the peritoneal epithelium. As the pressure is increased, these ooze out as long pear-shaped drops, and immediately assume a perfectly globular form, with a high refractive power. Below these is packed a dense crowd of *cnidæ*, arranged transversely.

The *Cinclides*. The emission of the *acontia* is provided for by the existence of special orifices, which I term *Cinclides*. The integument of the body, in the *Sagartiæ*, is perforated by minute foramina, having a resemblance in appearance to the *spiracula* of insects. They occur in the interseptal spaces, opening a communication between these and the external water.

The appearance of the *cinclides* may be compared to that which would be presented by the lids of the human eye, supposing these to be reversed; the convexity being inwards. Each is an oval depression, with a transverse slit across the middle. When closed, this slit may sometimes be discerned merely as a dark line (Plate XI. fig. 5, *m*), the optical expression of the contact of the two edges; but, when slightly opened (*l*), a brilliant line of light allows the passage of the rays from the lamp to the beholder. From this condition the lids may separate in various degrees, until they are retracted to the margin of the oval pit, and the whole orifice is open (*k*).

The dimensions of the *cinclides* vary not only with the species, and probably also with the size of the individual, but with the state of the muscular contraction of the integuments, and, as I think, with the pleasure of the animal. In a small specimen of *S. dianthus*, I found the width of a *cinclis*, measured transversely, $\frac{1}{275}$th of an inch; but that of another, in the same animal, was more than twice as great, viz. $\frac{1}{130}$th of an inch. This was on the thickened marginal ring, or parapet, which in this species surrounds the tentacles, where the *cinclides* are larger than elsewhere. Watching a specimen of *S. nivea* under the microscope, I saw a *cinclis* begin to open, and gradually expand till it was almost circular in outline, and $\frac{1}{275}$th of an inch in diameter. I slightly touched the animal, and it in an instant enlarged the aperture to $\frac{1}{200}$th of an inch. In a specimen of *S. bellis*, less than half grown, I found the *cinclides* numerous, and sufficiently easy of detection, but rather less defined than in *dianthus* or *nivea*. They occurred at about every fourth intersept, three intersepts being blind for each perforate one, and about three or four in linear series, but not quite regularly, in either of these respects. In this case they were about $\frac{1}{85}$th of an inch in transverse diameter, a large size,—and I measured one which was even $\frac{1}{65}$th of an inch. By bringing the animal before the window, I could discern the light through the tiny orifices with my naked eye.

From several good observations, and especially from one on a *cinclis*, widely opened, that happened to be close to the edge of the parapet of a *dianthus*, I perceived that the passage is not absolutely open, at least in ordinary, but that an excessively thin film lies across it. By delicate focusing, I have detected repeatedly, in different degrees of expansion, and even at the widest, the granulations of a membrane of excessive tenuity, and one or two scattered *cnidæ*, across the bright interval. On another occasion, in the case of a *cinclis* at the edge of the parapet—a position singularly favourable for observation—I saw that this subtle film was gradually pushed out until it assumed the form of a hemispherical bladder, in which state it remained as long as I looked at it. At the same time the outline of the *cinclis* itself was sharp and clear, when brought into focus farther in. The film, whatever it be, is superficial, and does not appear to be a portion of the integument proper. I take it to be a film of mucus (composed of deorganized epithelial cells), which is constantly in process of being sloughed from all the superficial tissues in this tribe of animals, and which continues tenaciously to invest their bodies, until, corrugated by the successive contractions of the animals, it is washed away by the motions of the waves. As, however, one film is no sooner removed than another commences to form, one would always expect external pores so minute as these to be veiled by a mucus-film in seasons of rest.

That the *cinclides* are the special orifices through which those missile weapons, the *acontia*, are shot and recovered, rests not merely on the probability that arises from the coexistence of the two series of facts I have above recorded, but upon actual observation. In a rather large *S. dianthus*, somewhat distended, placed in a glass vessel between my eye and the sun, I saw, with great distinctness, by the aid of a pocket-lens, many *acontia* protruded from the *cinclides*, and many more of the latter widely open. The *acontia*, in some cases, did not so accurately fill the orifice but that a line of bright light (or of darkness, according as the sun was exactly opposite or not) was seen, partially bordering the issue of the thread, while the thickened rim of the *cinclis* surrounded all.

The appearance of the orifices whence the *acontia* issued was that of a tubercle or wart, and the same appearance I have repeatedly marked in examples observed on the stage of the microscope; namely, that of a perforate pimple, or short columnar tube. This was clearly manifest, when the animal, slowly swaying to and fro, brought the sides of the *cinclis* into partial perspective.

On another occasion I witnessed the actual issue of the *acontia* from the *cinclides*. I was watching, under a low power of the microscope, a specimen of *S. nivea*, while, by touching its body rudely, I provoked it to emit its missile filaments. Presently they burst out with force, not all at once, but some here and there, then more, and yet more, on the repeated contractions of the corrugating walls of the body. Occasionally the free extremity of a filament would appear, but more frequently *the bight of a bent* one, and very often I saw two, and even three, issue from the same *cinclis*. The successive contractions of the animal under irritation, caused the *acontia* already protruded to lengthen with each fresh impetus, the bights still streaming out in long loops, till perhaps the free end would be liberated, and it would be a loop no longer; and sometimes a new thread would shoot from a *cinclis*, whence one or two long ones were stretching already; while, as often, the new-comers would force open new *cinclides* for themselves. The suddenness and explosive force with which they burst out, appeared to indicate a resistance which was at length overcome:—perhaps—in part at least—due to the epithelial film above mentioned, or to an actual epiderm, which, though often ruptured, has ever, with the aptitude to heal common to these lowly structures, the power of quickly uniting again.

It appeared to me manifest, from this and other similar observations, that no such arrangement exists as that which I had fancied;—that a definite *cinclis* is assigned to a definite *acontium*, or pair of *acontia*, and that the extremity of the latter is guided to the former, with unerring accuracy, by some internal mechanism, whenever the exercise of the defensive faculty is desired. What I judge to be the true state of the case is as follows: The *acontia*, fastened by one end to the *septa* or their mesenteries, lie, while at rest, irregularly coiled up along the narrow interseptal fossæ. The outer walls of these fossæ are pierced with the *cinclides*. When the animal is irritated, it immediately contracts; the water contained in the visceral cavity finds vent at these natural orifices, and the forcible currents carry with them the *acontia*, each through that *cinclis* which happens to lie nearest to it. The frequency with which *a loop* is forced out shows that the issue is the result of a merely mechanical action; which is, however, not the less worthy of our admiration because of the simplicity of the contrivance, nor the less manifestly the result of Divine wisdom working to a given end by perfectly adequate means. The ejected *acontia,* loaded with their deadly cnidæ in every part of their length, carry abroad their fatal powers not the less surely, than if each had been provided with a proper tube leading from its free extremity to the nearest *cinclis.*

The *Cnidæ.*—I come now to describe those minute but potent organs which constitute the object of all the mechanism above described. Four distinct forms of these capsules have occurred to my investigations; and these I shall treat of in turn.

(1.) *Chambered Cnidæ* (*Cnidæ cameratæ*). This is perhaps the most generally distributed form, as it is manifestly the most elaborately armed. It may be well examined in *Caryophyllia Smithii.* The globular heads of the tentacles seem, under pressure, to be literally composed of these capsules, the ends of which project side by side, as close as they can be packed, one against another. The form of these is long and slender, almost linear. The *craspeda* are also similarly studded with *cnidæ,* which are, however, of longer dimensions, and of fuller form. As I have seen no chambered cnidæ, in any species, so large as these, I shall take them as a standard for description, alluding to those of other species only when they differ from these.

They are perfectly transparent, colourless vesicles, of a lengthened ovate figure, considerably larger at one end than at the other (Plate XI. fig. 6). One of average dimensions measures in length ·004 inch, and in greatest diameter ·0005. In the larger (the *anterior*) moiety, is seen, passing longitudinally through its centre, a slender chamber, fusiform or lozenge-form, about ·00015 inch in its greatest transverse diameter, and tapering to a point at each extremity. The anterior point merges into the walls of the *cnidæ* at its extremity, while the posterior end, after having become attenuated like the anterior, dilates with a funnel-shaped mouth, in which the eye can clearly see a double-infolding of the chamber-wall. After this double fold the structure proceeds as a very slender cord, which, passing back towards the anterior end of the capsule, winds loosely round and round the chamber, with some regularity at first, but becoming involved in contortions more and more intricate as it fills up the posterior moiety of the cavity. The fusiform chamber appears to be marked on its inner surface with regularly recurring serrations, which are the optical expression of that peculiar armature to be described presently.

Under the stimulus of pressure, when subjected to microscopical examination, and doubtless under nervous stimulus, subject to the control of the will, during the natural exercise of the animal's functions, the *cnidæ* suddenly emit their contents with great force, in a regular and prescribed manner. It must not be supposed, however, that the pressure spoken of is the immediate mechanical cause of the emission: the contact of the glass-plates of the compressorium is never so absolute as to exert the least direct force upon the walls of the capsule itself; but the disturbance produced by the compression of the surrounding tissues excites an irritability which evidently resides in a very high degree in the interior of the *cnidæ;* and the projection of the contents is the result of a vital force.

In general the eye can scarcely, or not at all, follow the lightning-like rapidity with which the chamber and its twining thread are shot forth from the larger end of the *cnida.* But sometimes impediments delay the emission, or allow it to proceed only in a fitful manner, a minute portion at a time; and sometimes, from the resistance of friction (as against the glass-plate of the compressorium), the elongation of the thread proceeds evenly, but so slowly as to be watched with the utmost ease; and sometimes the process, which has reached a certain point normally, becomes, from some cause, arrested, and the contents of the cell remain permanently fixed in a transition state. Thus a long continued course of patient observation is pretty sure to present some fortuitous combinations, and abnormal conditions, which greatly elucidate phenomena that normally seemed to defy investigation.

In watching any particular *cnida,* the moment of its emission may be predicted with tolerable accuracy by the protrusion of a nipple-shaped wart from the anterior extremity. This is the base of the thread. The process of its protrusion is often slow and gradual, until it has attained a length about equal to twice its own diameter, when it suddenly yields, and the contents of the *cnida* dart forth. At this instant I have, in many instances, heard a distinct crack or crepitation, in the examination of *cnidæ* both of this species and of *S. parasitica.*

When fully expelled, the thread or wire, which I distinguish by the term *ecthoræum* (Plate XI. fig. 7, *n*), is often twenty, thirty, or even forty times the length of the *cnida;* though, in some species, as in most of the *Sagartiæ*, it frequently will not exceed one-and-a-half, or two times the length of the *cnida.*

The *ecthoræa*, which are discharged by *chambered cnidæ*, are invariably furnished with a peculiar armature. The basal portion, for a length equal to that of the *cnida,* or a little more, is distinctly swollen, but at the point indicated it becomes (often abruptly) attenuated, and runs on for the remainder of its length as an excessively slender wire of equal diameter throughout. In the short *ecthoræa* of *Sagartia,* the attenuated portion is obsolete.

It is chiefly upon this ventricose basal portion that the elaborate armature is seen, which is so characteristic of these remarkable organs. For around its exterior wind one or more spiral thickened bands, varying in different species as to their number, the number of volutions made by each, and the angle which the spiral forms with the axis of the *ecthoræum.* The whole spiral, formed of these thickened bands, I designate the screw, or *strebla* (fig. 7, *o*).

In the *ecthoræa* emitted by *chambered cnidæ* from the *craspeda* of *T. crassicornis*, the screw is formed of a single band, having an inclination of 45° to the axis, and becoming invisible when it has made seven volutions. In those from the same organ in *S. parasitica* we find a screw of two equidistant bands, each of which makes about six turns,—twelve in all,—having an inclination of 70° from the common axis. In those similarly placed in *Caryophyllia,* the *strebla* is composed of three equidistant bands, each of which makes about ten volutions—thirty in all—with an inclination of about 40° from the axis. In every case the spiral runs from the east towards the north, supposing the axis to point perpendicularly upwards.

Sometimes, especially after having been expelled for some time, the wall of the *ecthoræum* becomes so attenuated as to be evanescent, while the *strebla* is still distinctly visible. An inexperienced observer would be liable, under such circumstances, to suppose that the screw, when formed of a single band, as in *T. crassicornis,* is itself the wire; an error into which I myself had formerly fallen. An error of another kind I fell into, in supposing that the triple screw of the wire in *C. Smithii* was a series of imbricate plates: the structure of the armature is the same in all cases (with the variations in detail that I have just indicated); and the structure is, I am now well assured, a spiral thickened band, running round the wall of the *ecthoræum* on its exterior surface. I have been able, when examining such large forms as those of *Corynactis* and *Caryophyllia*, with a power of 750 diameters, to follow the course of the screw, as it alternately approached and receded from the eye, by altering the focus of the objective, so as to bring each part successively into the sphere of vision.

These thickened spiral bands afford an insertion for a series of firm bristles, which appear to have a broad base and to taper to a point. Their length I cannot determinately indicate, but I have traced it to an extent which considerably exceeds the diameter of the ecthoræum. These barbed bristles I denominate *pterygia*. (See fig. 7, *p.*)

The number of *pterygia* appears to vary within slight limits. As well as I have been able to make out, there are but eight in a single volution of the one-banded *strebla* in *T. crassicornis;* while in the more complex screws of *S. parasitica*, *Cor. viridis*, and *Cary. Smithii* there appear to be twelve in each volution.

The barbs, when they first appear, invariably *project* in a diagonal direction from the *ecthoræum;* and sometimes they maintain this posture; but more commonly, either in an instant, or slowly and gradually, they assume a reverted direction.

From some delicate observations, made with a very good light, I have reason to conclude that the *strebla*, and even the *pterygia*, are continued on the attenuated portion of the *ecthoræum*, perhaps throughout its length. In *Corynactis* and *Caryophyllia* I have succeeded in tracing them up a considerable distance. In the latter I saw the continuation of all these bands, with their bristles; but the angle of inclination had become nearly twice as acute as before, being only 22° from the axis. The appearance of the attenuate portion, as also of the base of the ventricose part, is exactly that of a three-sided wire, twisted on itself; the barbs projecting from the angles.

(2.) *Tangled Cnidæ* (*Cnidæ glomiferæ*). This form is very generally distributed, and is mingled with the former in the various tissues. In the genus *Sagartia*, however, it is by far the rarer form, while in *Actinia* and *Anthea*, it seems to be the only one.

The pretty little *Corynactis viridis* is the best species that I am acquainted with for studying this kind of *cnidæ*. Their figure is near that of a perfect oval (Plate XI. fig. 9), but a little flattened in one aspect, about ·004 inch in the longer, and ·0015 in the shorter diameter. Their size, therefore, makes them peculiarly suitable for observations on the structure and functions of these curious organs. Within the cavity is a thread (*ecthoræum*) of great length and tenuity, coiled up in some instances with an approach to regularity, but much more commonly in loose contortions, like an end of thread rudely rolled into a bundle with the fingers.

The armature of this kind does not differ essentially from that already described. It is true, I have detected it only in *Corynactis*, where the short *ecthoræum* of the tangled *cnida* is surrounded throughout its length by a barbed *strebla* of three bands. The barbs are visible under very favourable conditions for observation, even while the tangled wire remains enclosed in the *cnida*, but their optical expression is that of serratures of the walls, without the least appearance of a screw. This is the only species in which I have actually seen the armature of the *ecthoræum* in this kind of *cnida*, but I infer its existence from analogy, in other species, where the conditions that *can* be recognised agree with those in this, though the excessive attenuation of the parts precludes actual observation of the structure in question.

(3.) *Spiral Cnidæ* (*Cnidæ cochleatæ*). In a few species, as *S. parasitica*, *T. crassicornis*, and *Cerianthus Lloydii*, I have found very elongated fusiform *cnidæ* which seem composed of a slender cylindrical thread, coiled into a very close and regular spiral. In some cases the extremities are obtuse, but in others, as in *T. crassicornis*, the posterior extremity runs off to a finely attenuated point, the whole of the spire visible even to the last, the whole bearing no small resemblance to a multispiral shell, as one of the *Cerithiadæ* or *Turritelladæ* (Plate XI. fig. 10). The *ecthoræum* is discharged reluctantly from this form, and I have never seen an example in which the whole had been run off. So excessively subtle are the walls of the *cnida*, that it was not until after many observations that I detected them, in an example from *T. crassicornis*, which had discharged about half of the wire; I have not seen the slightest sign of armature on the *cethoræum*. So far as my investigations go, these *spiral cnidæ* are confined to the walls of the tentacles, in which, however, they are the dominant form.

(4.) *Globate Cnidæ* (*cnidæ globatæ*)? In the *acontium* of *T. parasitica* flattened under pressure, and finally expressed from its substance, are numerous more or less globose or ovate vesicles, which gradually push out a cylindrical protuberance *at each end*, sometimes to a length equal to that of the original form (figs. 11, 12). These vesicles appear filled with a fluid of different refractive power from that of the clear sarcode in which they are lodged; but no sign of contained thread have I been able to detect, nor have I seen any discharge beyond the protrusion above spoken of. I am not at all sure that these vesicles are consimilar in function with the true *cnidæ;* and I am still more doubtful about the bacillar bodies found in the acontioïd filaments of *T. crassicornis*.

In the indubitable *cnidæ*,—those which I have distinguished as (1) Chambered and (2) Tangled,—the emission of the *ecthoræum* is a process of distinct eversion. This is not a *solid* but a *tubular* prolongation of the walls of the *cnidæ*, turned in, during its primal condition, like the finger of a glove drawn into the cavity. Some of the observations on which I ground this conclusion I have already published, but it may not be impertinent to repeat them here, with others which have since occurred to me, all proving the same fact. In the discharge of the *ecthoræum* of the tangled *cnidæ*, it frequently runs out, not in a right line, but in a spiral form; whenever this is the case, each band of the spire is made, and stereotyped, so to speak, in succession, while the tips go on lengthening: the *tip only progresses*, the whole of the portion actually discharged remains perfectly fixed; which could not be on any other supposition than that of evolution. In the discharge of the chambered kind, the ventricose or basal portion first appears; the lower barbs fly out before the upper ones, and all are fully expanded before the attenuated portion begins to lengthen. This again is consistent only with the fact of the evolution of the whole. On several occasions of observation on the *chambered cnidæ* of *Caryophyllia*, I have actually seen the unevolved portion of the *ecthoræum* running out through the centre of the evolved ventricose portion. But perhaps the most instructive and convincing example of all was the following. One of the large tangled *cnidæ* of *Corynactis viridis* had shot about half of its wire with rapidity, when a kind of twist, or "kink," occurred against the nipple of the *cnida*, whereby the process was suddenly arrested. The projectile force, however, continuing, caused the impediment to yield, and minute portions of the thread flew out, piecemeal, by fits and starts. By turning the stage-screw I brought the extremity of the discharged portion into view, and saw it slowly evolving, a little at a time. Turning back to the *cnida* I saw the kink gradually give way, and the whole of the tangled wire quickly flew out through the nipple. I once more moved the stage, following up the *ecthoræum*, and presently found the true extremity, and a large portion of the wire still inverted; slowly evolving indeed, but very distinct throughout its whole course, within the walls of the evolved portion (fig. 8).

From all these observations, there cannot remain a doubt of the successive eversion of the entire *ecthoræum*. It may be asked, What is the nature of the force by which the contained thread is expelled? That it is a potent force, is obvious to any one who marks the sudden explosive violence with which the nipple-like end of the *cnida* gives way, and the contents burst forth; as also the extreme rapidity with which, ordinarily, the whole length is evolved. A curious example of this force once excited my admiration: the *ecthoræum* from a *cnida* of *Corynactis viridis* was in course of rapid evolution, when the tip came full against the side of another *cnida* already emptied. The evolution was momentarily arrested, but the wall of the empty capsule presently was seen to bend inward, and suddenly to give way, the *ecthoræum* forcing itself in, and *shooting round and round the interior* of the *cnida*.

The most careful observations have failed to reveal a lining membrane to the *cnida*. I have repeatedly discerned a double outline to the walls themselves—the optical expression of their diameter; but have never detected any, even the least, appearance of any tissue starting from the walls, as the *ecthoræum* bursts out. My first supposition, reluctantly resigned, was, that some such lining membrane of high contractile power, lessened, on irritation, the volume of the cavity, and forced out the wire.

The *cnida* is filled, however, with a fluid. This is very distinctly seen, occupying the cavity, when from any impediment, such as above described, the wire flies out fitfully—waves, and similar motions, passing from wall to wall: sometimes, even before any portion of the wire has escaped, the whole mass of tangled coils is seen to move irregularly from side to side, within the capsule, from the operation of some intestine cause. *The emission itself is a process of injection;* for I have many times seen floating atoms driven forcibly along the interior of the *ecthoræum,* sometimes swiftly, and sometimes more deliberately. Nothing that I have seen, would lead me to conclude that the wall of the *cnida* is ciliated.

I consider, then, that this fluid, holding organic corpuscles in suspension, is endowed with a high degree of expansibility; that, in the state of repose, it is in a condition of compression, by the inversion of the *ecthoræum;* and that, on the excitement of a suitable stimulus, it forcibly exerts its expansile power, distending, and *consequently* projecting, the tubular *ecthoræum,*—the only part of the wall that will yield without actual rupture.

The *cnidæ* cannot, I think, be regarded in the light of cells, since they are but the contents of other vesicles, which thus present a higher claim to the character of cell-wall. In the *craspeda* of *S. parasitica,* may be seen many of the chambered *cnidæ,* bearing this outer envelope, which, without determining anything concerning its nature, I shall distinguish as the *peribola.* Many of the *cnidæ* have ruptured their investing membrane, which gives way at no special point, sometimes at the anterior end, sometimes at the posterior, and as frequently, all down the side. The *peribola* thus ruptured, may be seen in many instances still hanging about the *cnida,* while others are quite free from any remains of it, and in some cases I have seen the *cnida* still enveloped in its *peribola,* unruptured.

The *peribola* I have seen investing, and hanging around the *cnidæ* of the *spiral* and *globate* kinds, and this circumstance has afforded me an additional ground for presuming the latter to belong to this category of organs (figs. 11, 12, *g*).

It appears necessary that the *cnida* should set itself free by the rupture of its *peribola*, before it can effect the emission of its *ecthoræum*. At least I have never met with an example of the contrary.

It has long been known, that a very slight contact with the tentacles of a polype is sufficient to produce, in any minute animal so touched, torpor and speedy death. Since the discovery of these *cnidæ*, the fatal power has been supposed to be lodged in them. Baker, a century ago, in speaking of the Hydra, suggested that "there must be something eminently poisonous in its grasp;" and this suspicion received confirmation from the circumstance that the *Entomostraca*, which are enveloped in a shelly covering, frequently escape unhurt after having been seized. The stinging power possessed by many *Medusæ*, which is sufficiently intense to be formidable even to man, has been reasonably attributed to the same organs, which the microscope shows to be accumulated by millions in their tissues.

Though I cannot reduce this presumption to actual certainty, I have made some experiments, which leave no reasonable doubt on the subject. First—I have proved that the *ecthoræum* when shot, has the power of penetrating, and does actually penetrate, the tissues of even the higher animals. Several years ago, I was examining one of the purple *acontia* of *Adamsia palliata:* no pressure had been used, but a considerable number of *cnidæ* had been spontaneously dislodged. It happened, that I had just before been looking at the sucker-foot of an *Asterina*, which remained still attached to the glass of the aquatic box, by means of its terminal disk. The cilia of the *acontium* had, in their rowing action, brought it into contact with the sucker, round which it then continued slowly to revolve. The result I presently discerned to be, that a considerable number of the *cnidæ* had shot their *ecthoræa* into the flesh of the sucking disk of the *Echinoderm*, and were seen sticking all round its edge, the wires imbedded in its substance even up to the very capsules, like so many pins stuck around a toilet pin-cushion.

To test this power of penetration still farther, as well as to try whether it is brought into exercise on the contact of a foreign body with the living Anemone, I instituted the following experiment. With a razor I took shavings of the cuticle, from the callous part of my own foot, as from the ball of the toe, and from the heel. One of these shavings I presented to the tentacles of a fully expanded *T. crassicornis.* After contact, and momentary adhesion, I withdrew the cuticle, and examined it under a power of 600 diameters. I found, as I had expected, *cnidæ* studding the surface, standing up endwise, the wires in every case shot into the substance. They were not numerous—in a space of ·01 inch square, I counted about a dozen.

I then irritated a *S. parasitica* till it ejected an *acontium*, and taking up with pliers another shaving of the cuticle, allowed it to touch the *acontium*, which instantly adhered across its surface. I now drew away the cuticle gently, so as not to rupture the *acontium*, and examining it as before, immediately saw dense groups of *cnidæ*, standing endwise on the surface, the *ecthoræa* all discharged and inserted in the substance almost to the very capsules. The groups were set in a sinuous line, across the cuticle, where the *acontium* had adhered, with scattered *cnidæ* between them on the same line. In one of these groups I counted thirty-five *cnidæ* in an area about ·0025 inch square.

These examples prove that the slightest contact with the proper organs of the Anemone is sufficient to provoke the discharge of the *cnidæ;* and that even the densest condition of the human skin offers no impediment to the penetration of the *ecthoræa.*

As to the injection of a poison, it is indubitable that pain, and in some cases death, ensues even to vertebrate animals from momentary contact with the capsuliferous organs of the ZOOPHYTA. The very severe pain, followed by torpor, lasting for a whole day, which Mr. George Bennett has described as experienced by himself, on taking hold of *Physalis pelagica*, was produced by the contact of the tentacles. The late Professor Edward Forbes has graphically depicted the "prickly torture" which results to "tender-skinned bathers," from the touch of the long filamentous tentacles—"poisonous threads"—of the *Cyanæa capillata* of our own seas; and observes that these amputated weapons *severed from the parent-body*, sting as fiercely as if their original proprietor itself gave the word of attack. I have been assured by ladies that they have felt a distinct stinging sensation, like that produced by the leaves of the nettle, on the tender skin of the fingers, from handling our common *Anthea cereus;* while, on the other hand, I have myself handled the species, scores of times, with impunity. And I have elsewhere* recorded an instance, in which a little fish, swimming about in health and vigour, died in a few minutes with great agony, through the momentary contact of its lip with one of the emitted *acontia* of *Sagartia parasitica*. It is worthy of observation, that, in this case, the fish carried away a portion of the *acontium* sticking to its lip; the force with which it adhered being so great, that *the integrity of the tissues yielded first. The Acontium severed, rather than let go its hold.*†

Now, in the experiments which I have detailed above, we have seen that this adhesion is effected by the actual impenetration of the foreign body, by a multitude of the *ecthorææ*, whose barbs resist withdrawal. So that we can with certainty associate the sudden and violent death of the little fish with the intromission of barbed *ecthorææ*.

I have instituted some experiments with a view to try whether acid or alkaline properties could be detected in the (presumed) fluid which is discharged. First with a solution of indigo, and afterwards with the expressed juice of violets, I occupied the plate of the compressorium; and in the flattened drop made the *cnidæ* in the *acontium* of *S. parasitica* to emit. In the case of the indigo, the colouring matter remained in the form of masses, but the juice of violets affords an apparently homogeneous fluid, even when reduced by pressure to an excessively thin film. I could not detect, even with the most careful scrutiny, the slightest tinge of discoloration of the blue fluid,—not the most delicate shade of red or green—along the side of the emitted *ecthorææ*, nor in the vicinity of the *cnidæ*. And though, in order to obtain a greater intensity of colour, I allowed a drop of violet-juice to dry on each plate of the compressorium, so that with a power of 800 diameters, the whole field was of a deep uniform translucent blue—still the ejected wire produced no change of tint.

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* "The Aquarium," ed. 1. p. 115.

† Dr. Waller has recently recorded an interesting experiment which he made with *Act. mesembryanthemum.* He allowed its tentacles to touch the tip of his tongue. "The result was such as to satisfy the most sceptical respecting the offensive weapons with which it is furnished. The animal seized the organ most vigorously, and was detached from it with some difficulty after the lapse of about a minute. Immediately a pungent acrid pain commenced, which continued to increase for some minutes, until it became extremely distressing. The point attacked felt inflamed and much swollen, although to the eye no change in the part could be detected. These symptoms continued unabated for about an hour, and a slight temporary relief was only obtained by immersing the tongue in cold or warm water. After this period the symptoms gradually abated, and about four hours later, they had entirely disappeared. A day or two after, a very minute ulceration was perceived over the apex of the tongue, which disappeared after being touched with nitrate of silver."—(*Proc. Roy. Soc. April* 14, 1859.)

Such a test as this is not sufficient to prove that no acid or alkaline property exists in the discharged fluid, and still less that no poisonous fluid at all is effused; since that most concentrated poison, the venom of the rattlesnake, is said to change vegetable blues to reds, in so slight a degree as to be scarcely perceptible.*

Admitting the existence of a venomous fluid, it is difficult to imagine where it is lodged, and how it is injected. The first thought that occurs to one's mind is, that it is the organic fluid which we have seen to fill the interior of the *cnida*, and to be forced through the everting tubular *ecthoræum.* But if so, it cannot be ejected through the extremity of the *ecthoræum*, because if this were an *open* tube, I do not see how the contraction of the fluid in the *cnida* could force it to evolve; the fluid would escape through the still inverted tube. It is just possible that the barbs may be tubes open at the tips, and that the poison-fluid may be ejected through these. But I rather incline to the hypothesis, that the cavity of the *ecthoræum in its primal inverted condition while it yet remains coiled up in the cnida*, is occupied with the potent fluid in question, and that it is poured out gradually within the tissues of the victim, as the evolving tip of the wire penetrates farther and farther into the wound.

Perhaps it is not too much to say that the whole range of organic existence does not afford a more wonderful example than this, of the minute workmanship and elaboration of the parts, the extraordinary mode in which certain prescribed ends are attained, and the perfect adaptation of the contrivance to the work which it has to do.

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* In a communication made by Dr. M'Donnell to the Royal Society, some experiments were detailed, which had led the observer to believe that electricity was the power in question. In a subsequent paper, however, that gentleman gave up his hypothesis. (*Proc. Roy. Soc. Jan.* 14, and *Nov.* 18, 1858.)

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BRITISH SEA-ANEMONES.

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GENERAL DESCRIPTION
AND EXPLANATION OF TERMS.

As it is of great importance in scientific description to employ precise terms for the various parts of the objects described, and for the conditions of those parts, and to use the same terms always in the same sense, I here define the terms which I propose to use in this work.

The principal parts of the body of a Sea-Anemone are the following:—the base; the column; the disk; the tentacles; the mouth; the cavity.

1. The Base (*Basis*).

This is the lowest part of the animal, usually forming a flat area, by means of which it adheres to other bodies. It is often EXPANDED (*expansa*), its outline being considerably broader than a section of the column. In some cases, as in *Edwardsia*, it becomes very small, loses its function, and finally, as in *Cerianthus*, disappears. In *Adamsia*, it is greatly extended *laterally* into two wings, which, curving round, meet and unite by their edges, forming a complete circle. This form of base may be distinguished as ANNULAR (*annularis*).

2. THE COLUMN (*Columna*).

The body rises in a more or less cylindrical shape, when the base is attached, like the trunk of a tree, often gracefully and rapidly diminishing from the basal expansion, and sometimes dilating towards the upper extremity:—this I call the COLUMN. At the SUMMIT (*vertex*), the column is, as it were, cut off transversely, forming a distinct MARGIN (*margo*). In some cases, as in *Actinoloba*, the margin rises into a thickened PARAPET (*tichium*) or low wall, separated from the tentacles by a groove or FOSSE (*fossa*). In others, there is neither parapet nor fosse. The margin may be NOTCHED (*crenata*); or, instead of notches there may be distinct tentacles, constituting the outer row of these organs; in this case the margin is TENTACULATE (*tentaculata*).

The surface of the column may be quite SMOOTH (*lævis*); studded with low warts,—WARTY (*verrucosa*); or marked with longitudinal sunken lines,—FURROWED (*sulcata*). When the furrows are deep and the intermediate spaces swell out in a rounded outline, it is INVECTED (*invecta*); when the column is surrounded by transverse wrinkles, it may be called INSECTED (*insecta*); when these insections are so deep as to seem to cut-off or divide the body into parts, it is CONSTRICTED (*constricta*); when the surface is crossed by numerous longitudinal and transverse wrinkles, it is CANCELLATED (*cancellata*); when minutely and very irregularly wrinkled, like the bark of a rough tree, it is CORRUGATED (*corrugata*). Some of these conditions are not permanently characteristic of any species, but are assumed temporarily during the changes of form induced by contraction. As to substance, the column may be tough and resisting, approaching a LEATHERY consistence (*coriacea*); FLESHY (*carnosa*), when soft but moderately firm; or PULPY (*pulposa*), when very soft and yielding.

The WARTS (*verrucæ*), in some species, are hollow, and furnished with a muscular arrangement by which a vacuum is formed, and the edges adhere firmly to foreign bodies; these may be called SUCKERS (*acetabula*). Other species have the skin and the muscular beds beneath it pierced with minute orifices, for the emission of armed threads; these may be called LOOP-HOLES (*cinclides*).

3. THE DISK (*Facies*).

This is the flattened upper extremity of the column, as the base is the flattened lower extremity. Its outline is circular; and this is recognised without difficulty when, as is usually the case, the edge is PLANE (*plana*); but sometimes the edge is WAVY (*undulata*), as in *bellis;* or even deeply FRILLED (*sinuosa*), as in *dianthus*. In *Actinia* proper, the disk bears, just within its margin, a row of SPHERULES (*sphærulæ marginales*); and, in every species, it carries the TENTACLES, and is pierced at the centre by the MOUTH. CONVERGING LINES (*radii*) cover the surface of the disk, starting from each tentacle-foot and meeting around the mouth. One RADIUS on each side of the disk, leading to each MOUTH-ANGLE (*gonidium*), is often more marked than the rest; these may be termed GONIDIAL RADII (*radii gonidiales*).

4. THE TENTACLES (*Tentacula*).

These are hollow cones springing from the surface of the disk, and arranged in one or more series of circles towards its margin. When there are more circles than one, that circle which is nearest the centre may be called the FIRST ROW (*series prima*); that which stands next to it towards the margin the SECOND (*series secunda*); and so on till we reach the OUTERMOST (*series extima*). With respect to each individual tentacle, its FRONT (*antica*) is that aspect which is next to the centre; its BACK (*postica*), that which is next to the margin; its RIGHT and LEFT SIDES (*latus dextrum*, *l. sinistrum*), those which depend upon these indications. Each tentacle has a FOOT (*radix*) and a TIP (*apex*).

5. THE MOUTH (*Os*).

The entrance to the stomach is placed, as has been stated above, in the centre of the disk. It is surrounded by a generally thickened LIP (*labium*), which is sometimes elevated on a CONE (*colliculus*), and sometimes level. The LIP may be SMOOTH (*læve*), or FURROWED (*sulcatum*); at each of two opposite points,—the MOUTH-ANGLES (*gonidia*),—there are placed two TUBERCLES (*lentigines*), between which opens an imperfect tube or groove formed by the approximation of two cartilaginous bands: these grooves, one at each mouth-angle, may be termed GONIDIAL GROOVES (*canales gonidiales*). Their function appears to be that of oviducts. (In *Actinoloba*, there is but a single mouth-angle, and a single groove).* From the lip descends into the cavity of the body a membranous veil, much gathered into folds, but free at the lower edge, like a sack without a bottom; this is the STOMACH (*stomachus*), of which the portion immediately below the lip may be conveniently termed the THROAT (*gula*).

6. THE CAVITY (*Venter*).

The whole of the region included between the walls of the column and the stomach-wall, and between the free edge of the stomach and the base, may be indicated by this term. It is divided into imperfect chambers by perpendicular muscular PARTITIONS (*septa*), all of which are inserted into the column-wall, but advance into the cavity in various degrees. Some are inserted by their inner edge into the stomach-wall, completely dividing-off the cavity: these may be called PRIMARY SEPTA (*septa primordialia*). Others are placed intermediately between these, which do not reach the stomach-wall; these are SECONDARY SEPTA (*s. secundaria*). Others, again, are intermediate between these and the former, whose height is still lower (these may be distinguished as TERTIARY (*s. tertiaria*); and so on, if there be any series beyond this. The spaces thus parted off in the cavity, I would call INTERSEPTS (*intersepta*). The free edges of the secondary and tertiary septa, and also of the primary ones below the stomach, carry a thin membrane which encloses the OVARIES (*ovaria*), and is terminated by a sort of CORD (*craspedum*), much twisted and involved. Long MISSILE CORDS (*acontia*) are in some species attached by one end to the partitions, and lie coiled-up, or float freely, in the intersepts: these are, by the voluntary contractions of the animal, forcibly ejected through the loop-holes, into which they are then gradually withdrawn. Both the *craspeda* and the *acontia* are almost wholly composed of THREAD-CAPSULES (*cnidæ*), which contain a coiled WIRE (*ecthoræum*). This wire is shot out under particular stimulus, and is an efficient weapon of offence; it is usually surrounded with one or more spiral bands composing the SCREW (*strebla*), each of which carries a series of BARBS (*pterygia*); and the whole apparatus is a vehicle for the infusion of some highly venomous fluid.

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* In *Actinopsis*, a singular form recently described by Messrs. Danielssen and Koren from the Norwegian coast, the gonidial tubercles are prolonged into a pair of long and rigid semi-cylinders, the sides of which are bent downwards, and the tips of which are cleft.

The different conditions assumed by the animal, may be distinguished as the FLOWER (*anthus*), when the disk with its tentacles is expanded; the BUTTON (*oncus*), when these are retracted and concealed by the closing over them of the summit of the column.

CLASS ZOOPHYTA.

Animals of radiate structure; of gelatinous or fleshy substance; more or less column-shaped; having, in general, one end permanently attached or temporarily adherent to foreign bodies; the other end forming a flat disk surrounded by one or more circles of tentacles, and pierced in the centre by a mouth opening into the digestive cavity; furnished with offensive weapons in the form of capsules imbedded in the tissues, each of which encloses a projectile poisoning dart; possessing no special organs of sense.

ORDER ACTINOIDA.

The visceral cavity inclosing the stomach, and divided into compartments by perpendicular partitions of membrane which support the reproductive organs; germs ejected through the mouth.

SUB-ORDER ACTINARIA.

Tentacles twelve or upwards, rarely warty; membranous partitions sometimes simple, sometimes depositing solid calcareous plates, which, with the surrounding walls, constitute the *corallum.*

TRIBE I.—ASTRÆACEA.

Tentacles many, in imperfect series, or scattered; *corallum* (when present) calcareous, consisting of cells containing many radiating plates; the plates prolonged outward beyond the cells which enclose them. (N.B. No known British species of this Tribe deposits a *corallum.*)

TRIBE II.—CARYOPHYLLACEA.

Tentacles many, in two or more series; mostly increasing by lateral buds; generally depositing a *corallum,* which is invariably calcareous, and many-rayed.

TRIBE III.—MADREPORACEA.

Tentacles in a single series, twelve (rarely more), sometimes obsolete: gemmiparous; gemmation lateral: coralligenous; *corallum* calcareous; cells [*calyces*] quite small; rays (*septa*) six to twelve, or obsolete: interstitial surface not lamello-striate. (*Not British.*)

TRIBE IV.—ANTIPATHACEA.

Animals with six tentacles, forming at the base horny secretions (fleshy, enveloping a horny axis). (*Not British.*)

TRIBE I.—ASTRÆACEA.

ANALYSIS OF THE NON-CORALLIGENOUS FAMILIES.

Base adherent at pleasure.	
Tentacles compound (*Not British*)	*Metridiadæ.*
Tentacles simple.	
Column pierced with loop-holes	*Sagartiadæ.*
Column imperforate.	
Column smooth.	
Margin simple	*Antheadæ.*
Margin beaded	*Actiniadæ.*
Column warted	*Bunodidæ.*
Base non-adherent.	
Lower extremity rounded, simple	*Ilyanthidæ.*
Lower extremity inclosing an air-chamber (*Not British*)	*Minyadidæ.*

TRIBE I.—ASTRÆACEA.

All the members of this Tribe with which we are familiar on the European shores are simple, and destitute of a corallum. But when those of all seas are taken into consideration, we find that the majority are compound and coralligenous. The increase of these is effected by the budding forth of new polypes from the single primary polype; and it is in the manner of this gemmation that the tribe *Astræacea* differs from the *Caryophylliacea.* In the former, increase invariably takes place by the extension of the summit, and not of the side or base. The process of widening, in budding polypes, may be confined to the parts exterior to the disk and visceral cavity below, or the disk and cavity may continuously enlarge; in the latter case, the buds open in the disks, the process of budding being the cause of their enlargement (DANA).

The greater part of the *Astræacea* increase by disk-buds, and spontaneous subdivision; the disk of the polype, and the cell of the corallum, gradually widening by growth, and finally separating into two portions, which become independent. A few only widen exteriorly to the disk, or in the interstitial spaces between the cells of aggregate corals (DANA).

The polypes in both this and the following tribe are many-tentacled; but, while this character distinguishes them from the two other tribes, it is of no assistance in discriminating those species with which we have to do. Moreover, as our *Astræacea* are all simple, it is difficult to apply the rule derived from the manner of gemmation. The spontaneous fission of some species, however, as *Actinoloba dianthus,* partially, and *Anthea cereus* completely, may help us to assign their affinities; and their general resemblance, *inter se,* and that of the whole to the polypes of the coralligenous *Astræacea,* leave little room for uncertainty.

FAMILY I.—METRIDIADÆ.

(*No European species.*)

FAMILY II.—SAGARTIADÆ.

I have thought fit to associate in this group those genera of the Tribe, which have the following characters:—They do not deposit a *corallum.* They have a broad base, capable, at the pleasure of the animal, of firmly adhering to foreign bodies, such as rocks, stones, and shells; or of being used as a foot, on which to creep, somewhat in the manner of a snail. They have always simple, smooth tentacles, arranged in (generally) uninterrupted circles at the margin of the disk, but often encroaching far upon its surface. Their body is for the most part pulpy or fleshy, generally lubricated on the surface with copious mucus; its exterior is often studded with sucking cavities, which have the power of adhering to foreign bodies, by the formation of a vacuum within the cavity, its muscular edges being appressed by the weight of the superincumbent atmosphere and water. The margins of these cavities do not rise into conspicuous warts when inactive. The integument is pierced with loop-holes (*cinclides*),—special orifices, through which are emitted and retracted fleshy cords (*acontia*), which have their origin in the membranous partitions of the body-cavity. These are filled with capsules (*cnidæ*), which are generally *chambered*, and which shoot a very short, but densely-armed wire (*ecthoræum*).

ANALYSIS OF THE GENERA.

Tentacles moderately long, slender.	
Disk perfectly retractile.	
Column destitute of suckers	*Actinoloba.*
Column furnished with suckers	*Sagartia.*
Column clothed with a rough epidermis	*Phellia.*
Disk imperfectly retractile.	
Base annular; parasitic on shells	*Adamsia.*
Base entire; not parasitic	*Gregoria.*
Tentacles mere warts; set in radiating bands (*Not British*)	*Discosoma.*

GENUS I. ACTINOLOBA (Blainv.).

Actinia (Linn.).
Cribrina (Ehrenberg).
Sagartia (Gosse).

Base considerably broader than the column; its outline often undulate, but entire.

Column pillar-like, in the expanded state; the margin forming a thickened parapet, or low wall, separated from the tentacular disk by a groove or fosse. Surface perfectly smooth, without suckers, but pierced with loop-holes. Substance approaching to pulpy.

Disk deeply frilled at the margin; thinly membranous.

Tentacles short, slender, not arranged in distinguishable circles, scattered at their commencement about half-breadth of the disk, becoming gradually smaller, more numerous and densely crowded as they approach the border.

Mouth surrounded with a thick lip; furnished with only a single gonidial groove, surmounted by a single pair of tubercles.

Acontia emitted somewhat reluctantly, but copiously upon occasion.

Only one British species.

THE PLUMOSE ANEMONE.

Actinoloba dianthus.

PLATE I. *Fig.* 1.

Specific Character. Body smooth, columnar when distended; five inches and upwards in height: mouth strongly furrowed, rufous: tentacles marked with a ring of white.

Actinia dianthus.	ELLIS, Phil. Trans. lvii. 436; tab. xix. fig. 8. JOHNSTON, Br. Zooph. Ed. 2. i. 232; pl. xliii. DALYELL, Anim. of Scotland, 235; pl. xlviii. figs. 6. 7; xlix. GOSSE, Aquarium, Ed. 2. 182; pl. v. TUGWELL, Manual of Sea Anemones, 56; pl. i.
senilis.	LINN. Syst. Nat. 1089.
judaica.	IBID. Syst. Nat. 1088.
pentapetala.	PENN. Br. Zool. iv. 104.
plumosa.	MÜLLER, Zool. Dan. iii. 12; tab. lxxxviii.; figs. 1, 2.
aurantiaca.	JORDAN, Annals. N. H. Ser. II. vol. xv. 85. (*juv.*)
Actinoloba dianthus.	BLAINVILLE, Actinologie, 322.
Sagartia dianthus.	GOSSE, Man. Marine Zool. i. 28.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to shells and stones: expanded considerably beyond the diameter of the column.

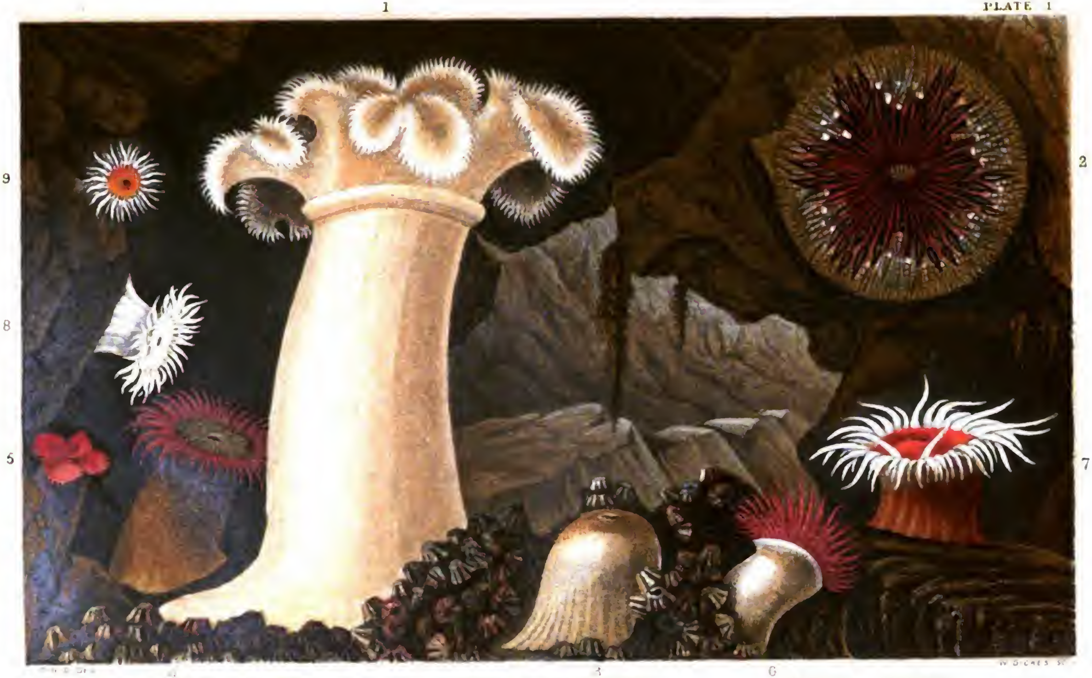
Column. Smooth, lubricated profusely with mucus; destitute of suckers, warts, wrinkles, furrows, and corrugations. Substance fleshy, approaching to pulpy. Form cylindrical, terminating in a simple thickened parapet, which is separated from the outer tentacles by a fosse.

Disk. Widely expanded, thin, greatly overhanging the column, deeply frilled.

Tentacles. Exceedingly numerous, moderately large and scattered at about the middle of the semi-diameter of the disk, but becoming smaller and closer outward, until they are excessively crowded, and very minute at the margin. In extreme youth they are comparatively few, and much longer in proportion.

Mouth. Not raised on a cone; lip thick, divided into lobes by strongly marked furrows. A single groove only at one of the mouth-angles, guarded by a pair of tubercles.

PLATE 1



1 ACTINOLOBA DIANTHUS
2 SAGARTIA BELLIS
3 SAGARTIA TROGLODYTES
4 5 6 S. ROSEA
7 SAGARTIA VENUSTA
8 9 S. SPHYRODETA

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TILDEN FOUNDATIONS
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COLOUR.

Column. Olive, olive brown, umber-brown, red-lead, pale-orange, salmon-red, flesh-colour, cream-white, pure white. ["Lemon-yellow," "peach-blossom."—DALYELL.]

Disk. Agrees with the column.

Tentacles. Generally agree with the column, but in the olive and brown varieties, they are sometimes almost wholly pellucid-white, and in all cases they are marked with a single transverse bar of white, near their middle; most conspicuous in youth.

Lip. Always rufous, or orange-red; whatever the hue of the body.

SIZE.

Specimens occasionally attain six inches in height, and three in thickness.

LOCALITY.

All round the coasts of Europe, in deep water, and on dark rocks between tide-marks.

VARIETIES.

These might be made as numerous as the various shades of colour above-mentioned: but for practical purposes it may be sufficient to distinguish the following:—

α. *Brunnea.* Including the shades of brown, from dingy blackish olive, to warm umber, or fawn-colour. Sometimes, as in examples that have fallen under my own observation, the tentacles, in these brown specimens, are almost white, marked with the more opaque white bar. There is not the slightest reason to assign these, as has been suggested, to another species.

β. *Rubida.* The various tints of red, from the full minium-scarlet to the peach-blossom and flesh-colour, may be classed under this variety, which is perhaps the most abundant of all.

γ. *Flava.* Sir John Dalyell enumerates "lemon-yellow" among the hues of this species; but it must be a very rare variety. I have never seen it.

δ. *Sindonea.* Perhaps this is the most elegant variety; the animal being clad in translucent white—"*simplex munditiis,*" as if arrayed in the finest Coan vestments. It is not uncommon.

This noblest of our native Sea-anemones seems to be entitled to generic separation from the *Sagartiæ*, with which I have hitherto associated it. Its form and habit, its puckered disk, its crowded and fringe-like tentacles, its thickened parapet and deep fosse, and the presence of only a single mouth-groove, are well-marked characters peculiar to it among our British species. This last peculiarity isolates the species from every other with which I am acquainted.

The generic appellation *Actinoloba*, I have adopted from De Blainville, who formed the genus in his "Actinologie" (1834). It is sufficiently expressive; but objectionable on account of its construction. It is a good canon that no generic name ought to form a part of a second generic name. In this case the word is constructed out of *Actinia*, and λοβὸς, a lobe or flap: it means, therefore, "the lobed Actinia." If it had been formed of the element *ἀκτίν, a ray*, the construction would have been unobjectionable, though the word would have been false in signification; for what the French zoologist wished to express was "a lobed Actinia," not "a creature with lobed rays (= tentacles)."

The specific name, *dianthus*, is due to a pretty fancy of Ellis, the father of English Zoophytology. Observing the resemblance which the *Actiniæ* bore to composite or many-petaled flowers,—a resemblance which is perpetuated in the popular appellation, Sea-Anemones,—he named such as were known to him after those lovely objects; *bellis*, the daisy; *mesembryanthemum*, the fig-marigold; *dianthus*, the pink. I do not know that we are to seek for special resemblances to the particular flowers chosen; one polypetalous flower might have served as well as another: still less shall we find any etymological significance in the appropriation. For the latter we must go back to the flower. In the present case, the pink and carnation genus is named *dianthus*, some say, for its great beauty (*δῖος, divine, ἄνθος, flower*); but it may be from its tendency to become double (δὶ, the sign of duplication, *διανθὴς, having full or double flowers*): the lexicons moreover give *διανθέω* (from διὰ), *to bloom*.

Müller has called *dianthus* the most beautiful of all the Anemones,—"*Actiniarum pulcherrima;*" and his verdict is surely correct, so far as it refers to European species. When we see a full-grown specimen of some of the more delicately coloured varieties,—the pale orange, the flesh-coloured, or the clear white,—rising erect from its broad base like the stem of a massive tree, crowned with its expansive disk of myriad tentacles, we cannot but consider it a most noble, as well as a most lovely object. It is only in expansion that it is beautiful. The *button* will sometimes shrink down to an abject flatness, scarcely more than an eighth of an inch in height in the centre, the circumference spread out on every side to cover an irregularly outlined area of some five or six inches in diameter, but no thicker than a card. In this condition it is almost a repulsive object, but, perhaps in a quarter of an hour, you look at it again, and the change seems magical. The animal has risen, and swollen, and distended its body with clear water, till the tissues appear plump, and almost transparent; it now forms a noble massive column, some five inches high, and three thick, from which the delicate frilled disk expands, and arches over on every side, like the foliated crown of a palm tree. Then again, on some cause of alarm, real or supposed, it will suddenly draw in its beautiful array of frills, contract around them its parapet, and assume a distended bladder-like figure, with the clustering tentacles just protruding from the slightly open aperture.

It is under the veil of night that the Anemones in general expand most readily and fully. While the glare of day is upon them, they are often chary of displaying their blossomed beauties; but an hour of darkness will often suffice to overcome the reluctance of the coyest. The species before us is not particularly shy; it may often be seen opened to the full in broad daylight; but if you would make sure of seeing it in all the gorgeousness of its magnificent bloom, visit your tank with a candle an hour or two after nightfall.

The membranous disk appears to be truly circular in outline, but so fully frilled that it is impossible to expand it on a plane. There are commonly from five to eight broad and deep involutions, which are sometimes simple, sometimes compound; in the latter case forming a semi-globular head of close slender tentacles, almost furry in character.

Mr. W. A. Lloyd has favoured me with the following note, on a tentacular peculiarity in this species:—

"In a marine tank belonging to a customer of mine, there is an *Act. dianthus* having one single long slender tentacle, high overarching the great fleecy mass of ordinary tentacles, and acting independently of them, very different from anything I have ever before seen in this species, and similar to the one solitary tentacle sometimes present in *A. bellis.*"

When very young, neither the frilled involution of the disk, nor the smallness of the tentacles, nor their crowded condition, is characteristic of the species. It is then very likely to be mistaken by an inexperienced observer for another form, or to be described as new. Professor Jordan has, I feel sure, fallen into this very excusable error; for the specimens which he has described* under the name of *Actinia aurantiaca* were certainly none other than infant *dianthuses.* Their size,—about half-an-inch high; their hue,—orange or almost salmon-colour; their tentacles,—of a greyer tint, with a whitish bar; their locality,—the under surface of an inclined mass of rock; their numbers,—

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* In the Annals of Nat. Hist. for Feb. 1855

many of the same size associated together; their habit,—hanging pendent from the midst of the acorn-shells and sponges, "like a rain-drop ready to fall;"—all agree exactly with the young of *dianthus.* My friend, in a private letter, tells me, moreover, that he is certain they were immature, from the length of the tentacles; and that his brother suspected them to be the young of *dianthus*, because he found old *dianthus* at the same spot. There can be no doubt that Mr. Charles Jordan is right.

A very heterodox notion seems to have obtained currency, that this species differs from other *Actiniæ* in that it is incapable of altering its place, when once it has selected it. Dr. Johnston says,—and his statement is the more surprising since he had seen "several hundreds of individuals,"—"As *A. dianthus* is a *permanently attached* species, and cannot be removed without organic injury to the base, it has some claim to be made the type of a genus." (Brit. Zooph. p. 234). If this were correct, the claim (which I have allowed on other grounds) would indeed be well founded; but the statement is erroneous. Sir John Dalyell, again, while allowing that *dianthus* shifts its position spontaneously, affirms that it cannot be compelled to do so with impunity. In illustration of this assertion he mentions the case of a very large one, which was attached to a stone too wide to be put into any of his vessels. In this emergency he reversed the stone, laying it across the top of a jar, so that the Anemone should hang suspended in the sea-water. He had hoped that the animal would voluntarily quit its hold, and descend into the jar, but it did not; and, after stretching itself for some days, it ruptured its body across the centre, apparently by its own weight, and died.*

Notwithstanding these excellent authorities, however, I can unhesitatingly affirm, both that the species travels as freely as any in captivity, and that it may be removed from its attachment with the utmost ease and impunity. In "The Aquarium" (p. 192) I had given evidence of both these facts, and experience has since confirmed them in numberless instances. Instead of repeating my own observations, however, I will fortify them with the authority of my friend Mr. Merriman, of Bridgnorth, who has favoured me with the following remarks on this subject:—

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* Rare and Rem. Anim. of Scotl., 235.

"Dr. Johnston's statement —— is not confirmed by my experience any more than yours. I have a very fine specimen of *dianthus*, which persisted in crawling up the side of my glass,—a circular one,—until part of its disk was actually above 'high-water level.' A few days ago it became necessary to empty my glass. Accordingly I drew off the water, and the *dianthus* hung in the most disconsolate way, looking very like an old wet kid-glove. Finding I could not finish my operation without entirely removing him, I worked him off with the back of my nail. Of course, at the first rude touch on his base, he shrank up into a ball, in which shape he continued, when I dropped him into some water to remain until I could restore him to his own home. While here he became quite like a ball of cotton, so many were the nettling-threads that he threw out on all sides. In two hours' time I put him back into the glass, having taken the precaution to place a bit of slate upright behind him, that I might not have the same difficulty again. In less than six hours he had stuck as firmly to the slate as he had previously done to the glass, and he has continued most magnificent ever since."

In spite of Sir John Dalyell's assertion, that this species is "less hardy than most," the fuller aquarian experience of the present day enables us to affirm that no British species is more readily preserved in confinement than *dianthus*.

There are probably thousands of specimens of this fine Anemone now living in the aquariums of Great Britain and Ireland; and a large number of these have been several years in captivity. They continue to live and flourish, expanding and erecting themselves with the greatest freedom; nor do they seem at all affected by the turbidity of the water, provided it be free from impurity. I have had some specimens of rather large size continue for many months in water so loaded with green Alga spores as to be almost opaque, yet during the whole period they appeared perfectly at ease, and even increased their number by fissiparous division. It is the frequent habit of the species to crawl up the perpendicular side of the tank which it inhabits, till it reaches the water's edge, a situation which seems particularly grateful to it; for there it remains from week to week, daily (or rather nightly) projecting its columnar form in a horizontal direction, at the very surface, and then expanding its beautiful frills, so that the air bathes a part both of its body and its tentacles.

I have never seen this Anemone increase its kind by proper generation, that is, by the discharge of ova, or of young. But no species more freely increases by spontaneous division. When a large individual has been a good while adherent to one spot, and at length chooses to change its quarters, it does so by causing its base to glide slowly along the surface on which it rests;—the glass side of the tank, for instance. But it frequently happens that small irregular fragments of the edge of the base are left behind, as if their adhesion had been so strong, that the animal found it easier to tear its own tissues apart than to overcome it. The fragments so left soon contract, become smooth, and spherical or oval in outline, and in the course of a week or fortnight may be seen each furnished with a margin of tentacles and a disk—transformed, in fact, into perfect though minute Anemones. Occasionally a separated piece, more irregularly jagged than usual, will, in contracting, constringe itself, and form two smaller fragments, united by an isthmus, which goes on attenuating until a fine thread-like line only is stretched from one to the other; this at length yields, the substance of the broken thread is rapidly absorbed into the respective pieces, which soon become two young *dianthuses.*

It is to this tendency to spontaneous division that I would attribute the frequent occurrence in this species of monstrosity, such as two disks uniting into a single column. This is very common. Dr. Johnston supposes that such cases are produced by the coalescence of two individuals which happened to be in contact, and he accounts for its frequency by the gregarious habit of the species.* The possibility of two individuals thus uniting, remains, however, to be proved; while the fissiparous habit, which is patent, is quite sufficient to produce the phenomenon.

I have been informed of a case, in which a young one was produced by gemmation from the base of the adult, without previous separation of the fragment.

When erect, and fully distended with water, the integuments and tissues become translucent, and, in parts, even transparent. In this condition, when favourably placed,—as when in front of a window, or with a candle just behind it,—an excellent opportunity is afforded of examining the internal arrangement of the organs, free from the confusion which the excessive contraction consequent upon dissection induces. The *septa* are seen stretching away into the general cavity, and the *acontia* lying in many coils along the intersepts; while ever and anon a minute coiled fragment, torn from some *acontium*, is seen driven to and fro along the intersepts, by the action of the cilia with which the interior membranes are covered. Occasionally, such a spiral fragment is driven into the interior of a tentacle, which is indeed but a continuation of the interseptal chambers—and here it is hurled to and fro in the ciliary currents, now shooting forward to the tip, then slowly retrograding, then again whirled towards the tip, which it appears to make the most strenuous efforts to reach; the combination of the twofold ciliary action,—that which is dependent on the cilia that line the interior of the tentacle, and that which results from its own richly ciliated surface,—imparting a vacillation and ever-varying impetus to its movements that may easily be mistaken for independent life. I have myself fallen into this error.*

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* Br. Zooph. 2nd Ed., 233.

The proper habitat of *dianthus* is the coralline zone. The trawlers in West Bay and Torbay bring up populous colonies from a depth of twenty fathoms. In Weymouth Bay it is specially abundant; and yet this apparent pre-eminence may be rather due to the fact that this celebrated locality has been so perseveringly dredged. Be it so or not, I can testify to the profusion with which the bottom of this bay, from the deep sea of the offing to three fathoms or less, is stocked with this fine Anemone. The oyster and scallop-banks of Portland and Brixham are favourite haunts. It is the habit of the species to live in society; and both the dredge and the trawl are constantly bringing to light clustered groups, as well as single individuals. Family groups are sometimes very numerous, as many as twenty being not uncommonly crowded on a single oyster-shell.†

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* Devonsh. Coast, 116.

† Dr. Battersby informs me that, in the summer of 1856, one of the trawlers brought into Torquay a water-logged board, about two feet long by one broad, on which were crowded between four and five hundred specimens of *A. dianthus*, of all sizes, but a considerable proportion of them large. What was curious was, that all on one side the board were white, all on the other orange.

Of course, in so limited a space, a large proportion of this number must consist of small individuals; and specimens in several gradations of development may often be observed, suggestive of as many generations, from the gigantic forefather of the family to the tiny great-grandchildren that crowd around his foot, no larger than split peas. From the fissiparous tendency above noticed, it is probable that these multiplications are but essential parts of one individual, not his descendants; analogous to the multiplication of a plant by *cuttings* as distinguished from that by *seeds*. There is no real process of generation in either case. What confirms my suspicion, that such is the true explanation of these congregated groups of *dianthus*, is the fact that, in general, all the members of each colony are of the same variety of colour. Now and then, however, we do see in the cluster a specimen of quite a different hue, as, for example, a dark olive one in the midst of a flesh-coloured group. In this case we must presume that there has been the deposition of a real germ,—the product of a really generative function—either from one of the individuals already settled there, or from some stranger. Flat stones, but more commonly large bivalve shells, such as oysters, pectens, and pinnæ, are the sites usually selected for the colonies of *dianthus*.

But though the floor of the sea is the proper home of the species, it is found, in certain favourable localities, to congregate in great numbers within tide marks. Where a breadth of semi-cavernous rock, honeycombed by mollusks, and studded with Alcyonia, Tunicata and Sponges, darkly overhangs a tide-pool, as around Petit Tor, and in the caves of Tenby and Lidstep; or where an immense boulder has so fallen upon others as to present a broad under-surface to the flowing tide; I have seen scores on scores of *dianthuses* hanging, dank and flaccid, from the rock, each with a globule of crystal water, suspended like a dew-drop from its drooping head. In general these are young individuals: I have never met with one between tide-marks, that exceeded an inch in diameter when contracted. What becomes of them as they attain riper years I do not know; I can only conjecture that they may retire, during the flow of the tide, to a more genial seclusion at a tideless depth. Mr. Peach tells me that he finds the species in pools between tide-marks at Peterhead;—"hundreds I have seen, some white and others brilliant red, side by side in the same pool." The same excellent observer assures me that he has obtained it four inches in height between tide-marks in that vicinity.

The following list of British localities will show the general distribution of this species.

Peterhead, Keith Inch (plentiful), *C. W. Peach:* Frith of Forth, *Sir J. G. Dalyell:* Berwick Bay, *Dr. G. Johnston:* Northumberland and Durham, *J. Alder:* Scarborough, Filey, *F. H. West:* Sandgate (rare), *E. L. Williams:* Guernsey, *E. W. H. Holdsworth:* Plymouth, *C. Spence Bate:* Selsey, Bognor, *G. Gatehouse:* Weymouth Bay, *P. H. Gosse:* Teignmouth (young), *R. C. Jordan:* Torquay (young); Torbay, *P. H. G.:* Dartmouth, and up the Dart as far as Dittisham, *E. W. H. H.:* Falmouth, *W. P. Cocks:* Lundy, Morte, *Rev. G. Tugwell:* Tenby, *P. H. G.:* Liverpool (under the pontoons of the landing-stage), *F. H. W.:* Mersey Estuary, Hilbre Island, *E. L. W.:* Morecambe Bay, *F. H. W.:* Clyde, near Glasgow (at low ebbs), *Miss Anne Church:* Cumbrae, *Rev. D. Landsborough:* Belfast and Strangford Loughs, Dublin Bay, *Dr. E. P. Wright.*[*]

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[*] Most of the above references rest on the authority of private communications made to me by friends; whose names, having been once given at length, I shall thenceforward cite by their initials.

Perhaps the most magnificent Actinia known is *A. Paumotensis*, described and figured in Dana's "Zoophytes." It was found at the Isle of Raraka, in the Paumotu group, by the naturalists attached to the American Exploring Expedition. It is twelve inches in diameter of disk, which is deeply frilled.

A. reticulata, from Terra del Fuego, is another fine and richly coloured species; with a frilled disk, and tentacles very numerous and fringe-like. Both these must doubtless be assigned to the genus *Actinoloba.*

A. Achates, a species dredged by the same Expedition, in thirty fathoms, on the east coast of Patagonia, has the frilled character of *dianthus*, with but three rows of tentacles, which are not specially crowded. It is evidently intermediate between *dianthus* and *bellis;* but further examination is necessary to determine to which genus it rightly belongs.

I may, however, venture to exhibit the affinities of our Anemone in the following gradation; distinguishing exotic species by [ ]:—

[Paumotensis.]
[reticulata.]
DIANTHUS.
[Achates.]
bellis.

GENUS II. SAGARTIA (GOSSE).

Actinia (LINN.).
Cribrina (EHRENB.).
Actinocereus (BLAINV.).

Base broader than the column; its outline often undulate, but entire.

Column in the expanded state pillar-like, sometimes low and thick, sometimes tall and slender; the margin notched or tentaculate, without parapet or fosse. Surface studded with suckers, which do not form permanent warts; pierced with loopholes. Substance fleshy, or pulpy.

Disk sometimes wavy; more commonly plane, sometimes slightly turned-over at the edge.

Tentacles varying in number, form, and arrangement in the different species.

Mouth generally elevated on a more or less conspicuous cone; furnished with two gonidial grooves, each with its pair of turbercles.

Acontia emitted freely and copiously.

NATURAL ORDER OF THE BRITISH SPECIES.

1. *bellis.*
2. *miniata.*
3. *rosea.*
4. *ornata.*
5. *ichthystoma.*
6. *venusta.*
7. *nivea.*
8. *sphyrodeta.*
9. *pallida.*
10. *troglodytes.*
11. *viduata.*
12. *parasitica.*

ARTIFICIAL ANALYSIS OF THE SPECIES.

Body salver-shaped; disk strongly waved	*bellis.*
Body of the usual form; disk nearly plane:—	
Tentacles without markings:—	
Disk and tentacles white	*nivea.*
Disk orange; tentacles white	*venusta.*
Tentacles with characteristic marks:—	
With a B-like mark at the foot	*troglodytes.*
A broad black bar above a narrow one at the foot:—	
Outer tentacles scarlet	*miniata.*
All the tentacles rose-purple	*rosea.*
Two broad black bars at the foot	*ornata.*
Two narrow black bars at the foot	*ichthystoma.*
A dark line down each side:—	
The lines unbroken	*viduata.*
The lines broken into several fragments	*parasitica.*
Tentacle foot enclosed—	
Within a purple circle	*sphyrodeta.*
Within two unconnected purple curved lines	*pallida.*

THE DAISY ANEMONE.

Sagartia bellis.

PLATE I. *Fig.* 2.

Specific Character.—Body salver-shaped, the disk forming a shallow circular cup, often wavy at the margin, of which the column is the foot. Tentacles small, numerous, in six rows, the outer ones mere crenations of the margin.

Actinia bellis.	ELLIS and SOLANDER, Zooph. 2. JOHNSTON, Br. Zooph. Ed. 2. i. 228; pl. xlii. figs. 1*, 3—6. GOSSE, Devonsh. Coast, 25; pl. i. figs. 1, 2.
pedunculata.	PENNANT, Br. Zool. iv. 102.
Templetonii.	COCKS, Rep. Cornw. Polyt. Soc. 1851. 8, pl. ii. figs. 10, 14.
Actinocereus pedunculata.	BLAINV., Dict. Sci. Nat. 1830; lx. 194.
Cribrina bellis.	EHRENB., Corall. 41.
Sagartia bellis.	GOSSE, Linn. Trans. xxi. 274: Man. Mar. Zool. i. 28; fig. 41.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; expanded considerably beyond the diameter of the column; the outline often undulate.

Column. Smooth on the lower half, on the upper studded with suckers, to which in freedom are often firmly attached minute fragments of shell, gravel, &c.; generally without wrinkles, furrows, or corrugations; but occasionally invected. Substance firmly fleshy. Form exceedingly variable, sometimes being thick and low, nearly equalling the disk in diameter; but, when expanded to the utmost, the column generally takes the form of a comparatively slender, lengthened, and perfectly cylindrical footstalk, abruptly expanding to a great circle, the margin of which is cut into minute notches which form the outermost row of tentacles.

Disk. In the condition just mentioned, this is a broad horizontal plate, or a slightly concave saucer, of which the rim is perfectly circular, though this form is often disguised by its being thrown into undulations, sometimes approaching to frillings.

Tentacles. Small, but numerous, arranged in about six rows; the first and second series containing about twelve each, the third about twice as many; the fourth again doubled; the fifth increasing in about the same proportion; and the sixth including about thrice as many as the fifth. Thus the total number may be about five hundred. Those of the first row usually stand erect, the others decline more and more as they recede, until the last two or three rows lie quite horizontally on the disk, to which the sixth row forms an exquisite fringe. Those of the first row rarely exceed one-fourth of an inch in height, and the others diminish regularly; those of the sixth are very minute; the longest (for they are not equal) scarcely exceeding the sixteenth of an inch in length, and some being mere tubercles; these are slender, and set so close together, that sixty are contained within an inch. Those of the inner rows are usually marked with a depressed line or groove, down the middle of the front.

Mouth. Not raised on a cone. Lip moderately thin, finely furrowed.

COLOUR.

Column. Lower part flesh-colour, often flushing into pink; gradually paling upward to white, drab, or buff in the middle part: this as gradually becoming dull violet on the upper third, where the suckers usually are conspicuous as pale spots.

Disk. Dark brown or black, the *radii* separated by fine lines of rich vermilion, commencing at the mouth, and diverging till they meet the tentacles, passing a little way up the sides of each.

TENTACLE OF S. BELLIS (*front*).

Tentacles. Yellowish-brown, studded with whitish specks, and varied with white or grey patches. There is commonly a dark-brown space near the base, bounded, above and below, by a band of pure white. Frequently groups of tentacles thus mottled alternate with equal groups of uniformly dull-brown ones; the regions of the discal border from which they respectively spring, corresponding in some measure, being either brown or lavender-grey. In many specimens a single tentacle, or sometimes two opposite ones, of the first series, are rather larger than the rest, and of an unspotted cream-white; when these occur, it is generally in connexion with one or two white *gonidial radii.* In other specimens there is no trace of such a distinction.

Mouth. Lip and throat white.*

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* The student will please to observe that the specific description is the description of *but one condition,* or variety. It is convenient to have a starting-point or standard of comparison, but it must not be supposed that this particular condition is the one proper to the species, and that the other

Size.

The average diameter of the disk is about one inch and a half; but large specimens attain a breadth of two inches. The height is dependent on the depth of the hole which they inhabit; in general it is about an inch, but sometimes it is as much as three inches, the column in this case being about three-eighths of an inch in thickness.

Locality.

The south and west coasts of England and Ireland, abundant; almost unknown in Scotland. Crevices, and holes in rock, chiefly in tide-pools.

Varieties.

α. *Tyriensis.* The condition described above, which is perhaps the most common; at least on our south-western coasts.

β. *Versicolor.* Disk dull yellowish-grey, with radiating broad bands of black; tentacular border alternately pale blue and dull black. One large tentacle of first row pellucid horn-brown; the rest dark grey, or white, in alternate groups. Column rose-pink on lower half, purple-grey on upper. Thus there are seven distinct colours in this variety, which yet is not at all showy.

γ. *Eburnea.* Disk ivory-white (TUGWELL).

δ. *Modesta.* Disk deep umber-brown, mottled with grey at the first row of tentacles, and merging into grey, lavender, or white, towards the third or fourth row. Tentacles mottled with brown and grey.

ε. *Sordida.* Column dull wainscot-yellow, paler at the basal region. Disk blackish-brown, freckled with grey and white spots. Tentacles similarly coloured. General form thick and clumsy, without the usual tendency to assume a salver-shape.

"varieties" are deviations from it. Those which I name *versicolor* or *modesta*, for example, might as well have been selected for the standard as *Tyriensis.* Indeed the only true idea of the species must include all its variations.

"We may attempt," observes a master in science, "to reach what is called the typical form of a species, in order to make this the subject of a conception. But even within the closest range of what may be taken as typical characters, there are still variables; and, moreover, no one form, typical though we consider it, can be a full expression of the species, so long as variables are as much an essential part of its idea as constants. The advantage of fixing upon some one variety as the typical form of a species is this,—that the mind may have an initial term for the laws embraced under the idea of the species, or an assumed centre of radiation for its variant series, so as more easily to comprehend those laws."—(DANA'S "*Thoughts on Species.*")

ζ. *Stellata.* Disk pale buff; a broad darker circle at the commencement of the tentacular border. Tentacles long and pointed; very pale stone-drab, each varied with pellucid patches, which give a pretty and delicate effect. But what is most peculiar is the alternate depression and elevation of the margin, a kind of frilling, which imparts to the disk a star-like form, usually of seven rays. This is a large and well-marked variety.

The genus *Sagartia* was established by me in a Memoir* read before the Linnean Society, March 20th, 1855. I then included in it *dianthus*, as well as the species to which I now confine it. The character on which I mainly relied in constituting it, appears to me, on maturer consideration, to mark a group of higher value than that of a genus; and I have accordingly used it to characterise a family. Hence it became necessary to make a fresh diagnosis of the genus, which, though large, appears a very natural one. The name I have chosen alludes to the peculiar mode of disabling their prey, by means of missile cords, which is possessed pre-eminently by the species of this group, recalling to my mind a graphic passage in the writings of the Father of History. In the army of Xerxes, he says,—"there was a certain race called Sagartians. The mode of fighting practised by these men was this:—when they engaged an enemy, they threw out a rope with a noose at the end; whatever any one caught, whether horse or man, he dragged towards himself, and those that were entangled in the coils were speedily put to death."†

The specific appellation of the present subject is the botanic name of a favourite flower,—the modest Daisy;—*bellis*, from *bellus*, *pretty*.

Though the Daisy Anemone is, as I have shown, subject to considerable variety, and has no one very strongly marked, and at the same time constant, specific character, there is scarcely any of our species more readily or more certainly recognisable. Its variations are circumscribed within appreciable limits, both of colour and form, and it has little tendency to merge into the characteristic condition of any other (British) species. Indeed, but for the needless multiplication of genera, I should be tempted to separate it from the other *Sagartiæ*, constituting for it, in association with two or three closely allied forms from the southern hemisphere, a distinct genus.

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* "Description of *Peachia hastata*, &c." Linn. Trans. xxi. 267.

† Herodotus, vii. 85.

From the elegance of its form, and its ready power of accommodating itself to captivity, few of our native species are more favourite tenants of an aquarium than this. Its habits, too, render it easily accessible. Within the limited range of its habitat it is for the most part abundant. The rugged, indented, rocky shores of Devon and Cornwall seem to be the metropolis of the species: and here the tide-pools, fissures, and honeycomb-like burrows of the *Saxicavæ*, are densely crowded with the pretty Daisy.

The broad front of Capstone Hill, at Ilfracombe, is broken, within the range of the tides, into a succession of narrow horizontal shelves, the angles of which run down into long fissures. The limestone promontory, known as Petit Tor, on the south-east coast of Devon, presents many ledges very similar in character, but more eroded into irregular holes and cavities. In both of these localities, *bellis* abounds, generally of the beautiful scarlet-lined variety, *Tyriensis*. Each usually occupies a little hollow, being attached by its base to the bottom, and expanding its beautiful disk over the edge. In the broader basins, moreover, which the waves have worn,

> " ——— hollows of the tide-worn reef,"

overshadowed by ribbon-shaped sea-weeds,—which are the very counterparts, in the sea, of the hart's-tongue fern fronds which overarch the green hedge-banks just above,—larger and finer specimens occur, apparently each broad coin-like disk stuck on to the smooth wall of the cavity, but really, as you find when you attempt to capture it, imbedded in its own proper cranny, into which it can retire out of danger.

But it is as common to find colonies of the species, inhabiting the long narrow fissures, covered with but an inch or two of water when the tide is out; five, ten, or even twenty individuals crowded together in a line as close as their bases, firmly planted side by side, will admit. Here, of course, when expanded, the puckered edges of each disk press upon and fit into the mutual irregularities of the others; and the effect is very attractive, when the variety is that patched one, pale blue and black, which I have named *versicolor*.

I have much admired them in this condition along the foot of the lofty overhanging cliffs at Watcombe, between Teignmouth and Torquay. Huge masses of the red conglomerate have fallen from above, and are piled in confusion along the whole sea-line. And these seem to have formed a natural breakwater, protecting the base of the cliff from the action of the waves. Hence the lower part of the rock remains *in situ*, while all the upper and middle portions have been detached by the influence of rains and frosts, and have fallen; and this lower part forms a succession of sloping terraces, averaging perhaps some twenty feet above low-water mark. Each successive terrace dips to the northward at a very gentle angle with the horizon, so that the explorer has to mount from one to another in turn, while he pursues the line of coast, as each slope successively brings him to the water's edge. These terraces are very rough, but not unpleasant to walk upon; and their angles are occupied with water, forming long narrow shallow pools, the bottoms of which run down into thin crevices. In these crevices reside the Daisies in question, in great numbers, and some of them of very large dimensions, as three inches in diameter, when fully expanded. They are, however, as I have said above, mostly so crowded together, that they are not able to spread their blossom-disks fully, but are fain to accommodate each other, by allowing the protrusions of one sinuous and frilled margin to fit into the recesses of another. They thus constitute lines of variegated frills, in which the individuals cannot be separated by the eye of the beholder; and though no brilliant hues appear, there is sufficient contrast between the black and the white, the blue and the grey, all puckered and convoluted as the fringed outlines are, to gratify the eye.

Nor are these very difficult of possession. For the conglomerate, though hard, yields readily to the chisel, and the edges of the crevices present in many cases fair angles for the blows of the experienced collector.

The Daisy is not unfrequently brought up in the dredge from a few fathoms' depth. In Weymouth Bay I have repeatedly obtained it thus, but still maintaining its wonted troglodyte habit; for its favourite domicile is one of the deep angular chambers formed by the leafy expansions of that fine coral-like Polyzoan, *Eschara foliacea.*

But Weymouth possesses a breed of the species which deviates much more widely from the normal habit. It is the variety which I have called *sordida*, having an eye not less to its filthy dwelling-place than to its dirty colour. The broad expanse of fetid mud, either wholly bare at low tide, or covered only with a foot or two of water, that floors the two inlets called the Fleet and the Backwater, is studded with multitudes of these dingy Anemones. The soft slimy mud affords no proper surface for adhesion;

and hence the animals can scarcely be said to adhere in the manner of the family, but simply to rest on the broad base. This is not, however, indicative of any defect in the power of adhesion; for on being removed to a basin of sea-water, they are soon found firmly attached to the bottom and sides.

With these exceptions I have not found *bellis* at Weymouth; which is the more remarkable since the long ledges of low rock, broken into fissures, and excavated into numberless hollows, would seem to present a favourable site for it. But since my residence there, it has yielded, in considerable abundance, the beautiful variety *stellata;* which, as I understand, occurs to the north-east of the town.

In Dr. Johnston's Brit. Zooph. (p. 231) may be found some curious figures by Mr. Cocks, illustrative of the protean mutability of shape manifested by this species. This depends on the power of distending the body generally with water, together with that of strongly constringing some part, the constriction ever moving its place.

Several of the *Sagartiæ* (as *S. bellis, miniata,* and *troglodytes*) have a singular habit of elongating to an immense extent one of the tentacles, while all the rest remain in the ordinary condition. The phenomenon has once or twice fallen under my own observation, but I will describe it in the words of some of my kind correspondents, who have from time to time directed my attention to it.

It seems to have been first noticed in *S. troglodytes* by Mr. Hugh Owen of Bristol, who, in May, 1856, mentioned the fact in a letter to me. Soon afterwards he observed the same phenomenon in "a loosely-formed *bellis*, with longer *tentacula* than usual, found in a cave at Tenby." "I was, a few days since," he writes, "watching it closely, when one tentacle began to extend itself; and for an hour I watched its motions. The animal is about an inch and a half in extreme diameter, and it threw out its tentacle to a distance of *three inches* from the margin. Of course all colour disappears, and it requires one to be looking for the fact to observe the transparent membranous nature of the extended limb. I tried if its object was seeking for food, by dropping a scrap of meat in the way of the tentacle: it was seized and carried to the oral disk instantly."

The same gentleman in a subsequent letter (dated 7th July, 1856) thus continues his observations:—"Another specimen of *bellis*, from Ilfracombe, of a dark self-colour (chocolate or umber-brown), is constantly extending the tentacles to full four times their length under ordinary circumstances; and on one occasion I have seen a tentacle on each side thrown out so long as to command fully a circle of six inches in diameter. After the extension, I observe that the tentacle assumes for several hours a white appearance, increasing in intensity towards the extreme tip. This extreme extensility is interesting, as showing the resources of the animal in commanding a larger range for feeding: and the *modus operandi* is no less curious; for, after having reached the utmost length, any nearer spot is examined by curling the tentacle into a variety of elegant curves and rings."

Mr. E. W. H. Holdsworth has also favoured me with some interesting observations on the same curious habit. Referring to an example which he had already described to me in the case of *S. miniata*, and which will be detailed in its place,* this excellent observer says:—"Since my last letter I have seen the elongation of one of the tentacles of the first row in *bellis*. The ordinary shape and proportions were retained, but the arm was stretched to more than twice its natural length, yet without any appearance of unnatural tension or straining: it was constantly in motion, apparently feeling about for something, but assumed its usual size after a few hours. It was altogether very different from what I have observed in the case of *miniata*."

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* See *infra*, p. 44.

The Daisy is prolific in captivity. Mr. Holdsworth tells me that he has known 146, 160, and nearly 300 thrown out from single individuals in one day. They appear between the tubercles at the summit of the gonidial grooves; these grooves evidently acting as ducts for the transmission of the fully-formed young from the intersepts to the external world, and doubtless for that of the ova, when these are discharged. The characteristic form and markings are distinctly recognisable in the newly-born young; their principal distinction, besides size, consisting in the fewness of their tentacles, which are commonly twelve in number, and in the comparative length of these organs, which is much greater than in the adult. Mr. Holdsworth says: "I have observed in this species, as well as in *dianthus*, and [*Bunodes*] *gemmacea*, that the size of the young varies with that of the parent,—large parents producing large young ones, and *vice versâ*. I have noticed it repeatedly; and the fact may perhaps be accounted for by the greater capacity of the larger parent affording room for a further development of the young before they are expelled than could be admitted of in the case of a smaller individual; for the mature ova, I imagine, are always of the same size in the same species."

I have already remarked that this species is easily kept in the Aquarium. It requires, however, some caution and skill in the manner of its capture; for, as it resides in holes and crevices of the solid rock, it cannot be worked off with the nail, like some others, but must be cut out with a steel chisel. And, unless this operation be carefully performed, there is danger of tearing away the animal from its base, the central portion of which may be left behind. In this case it will expand in captivity, and look healthy to the eye of the tyro; but, when examined, it will be seen to be perforate, a stick thrust in at the mouth coming out at the base. Specimens so mutilated never recover.

Little more than ordinary treatment is required for *S. bellis*. It is desirable that it should be gently pushed, base downward, into a hole of a piece of rock;—flints are often found suitable for it;—or, if such cannot be readily obtained, two pieces of stone may be set side by side, and the Daisy dropped between them. Then it will soon attach itself to the bottom or sides of the crevice, and expand its beautiful disk, like a broad coin, at the top.

S. bellis appears to be essentially a southern form. Sir John Dalyell, in his twenty years' experience, seems never to have met with it on the Scottish Coast; nor has it, so far as I know, occurred on the Scandinavian or Danish Coasts, nor on either shore of the German Ocean. On the south-western shores of Scotland, however, it has recently been found in some numbers.

On the other hand, it has recently been obtained near Boulogne; Mr. Holdsworth finds it "by myriads" near Oporto; Rapp and Lamarck give the Mediterranean generally as its habitat; and De Blainville, more specially, la Mer de Naples.

The following list of British localities is as complete as I have been able to make it.

Guernsey (abundant), *E. W. H. H.:* Selsey, *G. G.:* Weymouth, *P. H. G.:* Torquay, *P. H. G.:* Dartmouth, *E. W. H. H.:* Falmouth, *W. P. C.:* Mount's Bay, *Gaertner:* Lundy, *G. T.:* Ilfracombe, *P. H. G.:* Tenby (rare), *P. H. G.:* Holyhead, *E. L. W.:* Man, *F. H. W.:* Puffin Island, *E. L. W.:* South Corrigills, Arran, *T. S. Wright:* Cumbrae, *D. Robertson:* Rathlin, *J. Templeton:* Balyholme Bay, *W. Thompson:* Dublin Bay, *E. P. W.*

Of foreign species the beautiful *S. decorata* (DANA), found in the Lagoon of Honden Island, is closely allied to our *bellis.*

S. Fuegensis (DANA), from Terra del Fuego, a very fine species with rich yellow column and disk, and grass-green tentacles, has much in common with the subject of this article, but it has far more prominently the characters, that the tentacles are short, and spring isolatedly from the disk.

S. impatiens (DANA) has the habit of elongating the column pillar-wise, and of variously constringing and writhing the body; thus appearing to be intermediate between *bellis* and *viduata.*

It seems to be through *bellis* and *Fuegensis*, that the genus *Sagartia* leads off to the curious *Discosoma nummiforme* of the Red Sea, in which the column has no appreciable height, the animal being a very thin, flat, circular plate, with the tentacles reduced to minute warts, arranged in groups which form radiating bands.

Of native species *S. parasitica* and *B. clavata* present, in the expanded character of their disks, marked relations with *bellis.* But a still closer affinity exists between *bellis* and *Aiptasia amacha*, in the characters both of the disk and of the column, as I shall notice more particularly when I come to describe the latter.

It ought never to be forgotten that the order of sequence which we are compelled to adopt in treating of creatures in a book—that of placing each species between two others—can by no means express all their relations. Every species stands in the midst of many others, some closer to it, some more remote, to which it is linked more or less obviously. "Ten or twenty links would often be insufficient to express these numerous relations."* To obviate in some measure the false impressions liable to be produced by this unavoidable order of linear succession, I endeavour to represent some of the radiations of relation, in the following manner, observing that more direct affinity is expressed by the perpendicular order.

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* Cuvier.

dianthus
[Achates] A. amacha
parasitica BELLIS B. clavata
[Fuegensis] ——? [impatiens]
[Discosoma] miniata viduata.
rosea

The late Edward Forbes described* what he considered to be "the *Actinia bellis* of British authors, not of Rapp," but which certainly cannot be referred to the species as now recognised. He obtained several specimens by dredging on the Manx coast in September; and it would be worth while to examine that prolific locality afresh for the animal, which will probably prove an unnamed species. "The body is cylindrical, of a reddish, or reddish white colour, regularly and finely *striated longitudinally and transversely*, and having glands of a *bright yellow colour*, small and not very numerous, scattered over the surface. At the oral end the body bulges, forming a calyx [cup], on which the furrows are fewer but more granulose. When the disk is expanded, this calyx laps back, and is then almost even with the expanded tentacula. Disk *angular*, in my specimens *square*, surrounded by three or four rows of short tentacula, thickly set, of a white or brownish colour, variegated; having generally *a white line down the centre* of each. The disk is broad, brownish, or orange, with white lines. The margin of the *mouth* is *bright orange.* The animal can *project its disk forward* in a pouting manner. Tentacula and disk retractile. The specimens described were about one inch long when expanded, but I have seen larger."

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* In the Annals N. H. for May, 1840.

I have marked with italics the principal points in the above description, which seem inconsistent with the supposition that *bellis* can be the species intended. The figures (which are engraved from the late Professor's drawings, in Johnston's Brit. Zooph., 2d Ed. pl. xlii. figs. 3 to 6) can no more be reconciled with our *bellis* than the description.

THE SCARLET-FRINGED ANEMONE.

Sagartia miniata.

PLATE II. *Figs.* 2, 3, 4.

Specific Character. Tentacles with two sub-parallel dark lines along the front: a white space at foot, crossed by a broad black bar, and a narrow one below it. Outer row of tentacles with a scarlet core.

Actinia miniata.	GOSSE, Annals N. H. Ser. 2, vol. xii. 127.
ornata.	T. S. WRIGHT, Proc. Roy. Phys. Soc. Edinb. 1855.
Bunodes (?) *miniata.*	GOSSE, Man. Mar. Zool. i. 29.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks and shells: slightly exceeding the column.

Column. Minutely corrugated, studded on the upper half with large suckers. Substance fleshy. Form thick, the height rarely exceeding the breadth; not very variable.

Disk. Undulate, scarcely exceeding the diameter of the column; radii strongly marked, and covered with transverse striæ.

Tentacles. Moderately numerous, arranged in about four rows. Those of the first row average in length about half the diameter of the disk; the others diminish outwards, the last row being not more than one-fourth as long as the first. They are lax, and are usually arched over the margin, or thrown into sigmoid curves.

Mouth. Not raised on a cone. Lip strongly crenate.

Acontia. Emitted freely and copiously.

COLOUR.

Column. Deep rich brown, of a tint intermediate between burnt sienna and scarlet, sometimes merging into deep orange, paling into buff or light red towards the base, and often deepening into purplish-brown towards the summit. Suckers pale buff, which in the button-state become confluent, and form pale radiating bands, around the pursed aperture.

Disk. Yellowish or greenish-grey, the radii distinctly mottled with darker grey or brown; very variable. Sometimes one, or a pair, of broad white gonidial radii.

TENTACLE OF S. MINIATA (*front*).

Tentacles. Pellucid pale-brown, or yellowish, indistinctly annulated with dusky. The front face of each (except the outer row) is marked with two longitudinal dusky lines, parallel with the sides, and meeting at the summit: these are sometimes interrupted by a pale band crossing the middle of the tentacle. Below them, at the tentacle-foot, is a large space of white, which is crossed by two bars of black; the upper one thick and very constant, the lower slender, and sometimes thinned away to a mere shade in the middle. Groups of tentacles often occur of a more or less opaque white, but barred like the others, with which they form alternate clusters. Those of the outer row consist each of a pellucid sheath investing a core of scarlet or brilliant orange, resembling in appearance the central gland in the papilla of an *Eolis*. This effect seems to depend on the pigment being spread over the interior surface of the wall of the tentacle, which is unusually thick and colourless.

Mouth. Orange-red.

SIZE.

Specimens attain a height of two inches, with an equal width of disk.

LOCALITY.

The south and west coasts of England, from Deal to Arran. Rock-pools and deep water.

VARIETIES.

a. Ornata. To the state above described, which may be considered as the normal colouring, I appropriate this name, which was applied by my friend Dr. T. Strethill Wright, to the species, which he described, believing it to be new. (Plate ii. fig. 4.)*

β. Venustoides. Disk rich orange. Tentacles opaque yellowish-white or pure white, marked, however, with the two characteristic black bars; the outer row showing traces, more or less conspicuous, of the orange lining. This variety, from Ilfracombe and Torquay, has much *prima-facie* resemblance to *S. venusta;* but the specific marks of the tentacles, the strong crenation of the mouth, and the well-defined and concentrically striate radii are good signs of distinction. (Plate ii. fig. 3.)

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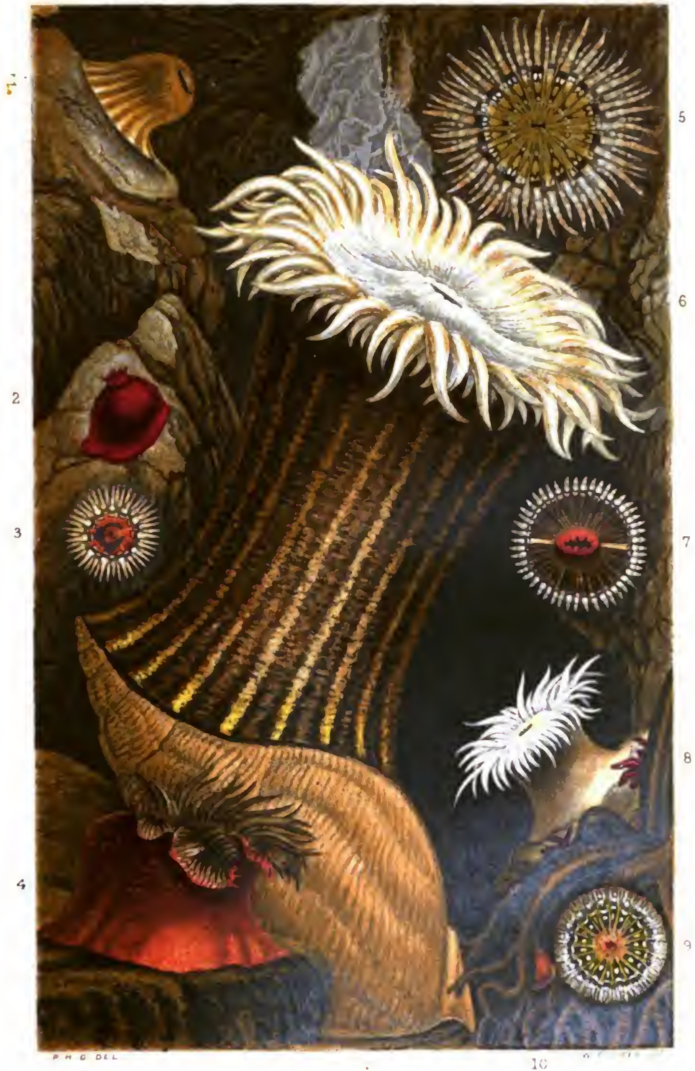
* My friend Mr. F. H. West has received a specimen from the vicinity of Boulogne, with the disk more variegated than is usual with our specimens, and which had this peculiarity, that one-half of the disk was flushed with a delicate rose-pink, and the opposite half with an equally lovely shade of green.



1. 8 SAGARTIA NIVEA
2. 3. 4 S. MINIATA

5 S. TROGLODYTES
6 S. PARASITICA

7 S. ICTHYSTOMA
9. 10 S. ORNATA

γ. *Roseoides.* Column orange-brown; disk pale yellowish-grey; tentacles rose-coloured, with the proper markings; and the outer row either wholly or partially scarlet-cored. Dartmouth, Plymouth. This is exceedingly like *S. rosea.* (See the article on that species.)

δ. *Niveoides.*[*] Column drab-olive. All the tentacles opaque white, except five groups sub-symmetrically arranged, each group comprising a few tentacles of a pale orange-buff hue. A single specimen in the possession of Mr. G. H. King, of Torquay, obtained by him in the vicinity.

ε. *Coccinea.* Column deep pellucid crimson: tentacles crimson. This approaches a common state of *A. mesembryanthemum* in its appearance and colouring: its suckers, however, will in a moment distinguish it on examination, and the usual row of orange-cored tentacles determines its true character. (Plate ii. fig. 2.)

ζ. *Brunnea.* Column umber- or even bistre-brown, with pale suckers: tentacles with the characteristic bars much disguised, and almost lost in a general cloud of dusky black occupying the lower half of the tentacle: this is divided by a narrow whitish band from the terminal half, which is pellucid umber. The tentacles are unusually long. Those of the outer row are not all scarlet, some being white; all, however, have the cored appearance. Torquay.

It may suffice to particularise these varieties, but specimens are frequently found combining the characters of several, and running into one another by imperceptible gradations. I obtained a very young individual at Weymouth, which I assign to this species, in which the tentacles of all the four rows were cored with the richest orange.

I first became acquainted with this very fine species in the summer of 1853, at Weymouth, where I found several specimens adhering to the shells of oysters and pectens, brought to market by the trawlers. Since that time I have met with it in some abundance in the neighbourhood of Tenby, especially on the eroded surface of some dangerous rocks, known as the Woolhouse Rocks, lying about a mile off shore, and exposed only at low water. In the pools and hollows of this reef, open to investigation only under favourable circumstances of wind and weather at the equinoctial spring-tides, this, with other lovely kindred species, as *rosea*, *nivea*, &c., expands its beautiful blossom, in charming abundance.

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[*] In these compounds I take the liberty of using the elements "*venusta*," "*rosea*," and "*nivea*," not as Latin adjectives, but as words now having the force of proper names.

But still more profusely does it occur in certain situations in the vicinity of Torquay. The line of shore between the Baths and Meadfoot is very bold, and a great number of precipitous insular and peninsular rocks fringe the sea-margin. When the tide is very low, and when the sea is very smooth, a small boat can penetrate into the narrow straits and caverns formed by these fragments: and there, on their landward sides, where the rays of the sun never reach, may be seen myriads of Anemones, chiefly of this species, but mingled with *dianthus*, *rosea*, and *nivea*, and varied by a vast number of *Alcyonium digitatum*, which beneath the surface of the clear water are seen blossoming with their lovely polypes.

The finest specimens I have seen are those which Mr. W. A. Lloyd obtains from the Menai Straits. The species seems to be specially abundant in that locality, and specimens two inches in diameter are not at all rare. The varieties *ornata* and *brunnea* are the prominent forms.

The habit referred to, under *S. bellis*, of greatly lengthening one of the tentacles, is possessed by this species also. Mr. E. W. H. Holdsworth has favoured me with the following note. "In two specimens of the Rosy-armed *miniata* [var. *roseoides*] I have observed a remarkable elongation of one of the tentacula, apparently of the second row. Under the microscope the surface appeared corrugated [or transversely annulated], but mostly so when the arm was fully distended, and the corrugations were most decided at the free end, which was enlarged, truncate, and slightly dimpled at the centre. No use was made of this long arm when the animal was feeding: it hung down as if it did not possess any particular function. It had the same colour as the others; but was not, like them, wholly withdrawn when the animal was closed. In fact, it appeared as if rather in the way, and not easily disposed of by its possessor. After about a week [the phenomenon] disappeared, and I have seen nothing of the lengthened arms since, in either of the specimens that had had them."

Those curious missile filaments which I have named *acontia,** are discharged by this species in great profusion. They are, as usual, white, but appear to possess the power of discharging a pigment. A large specimen, which I had irritated by forcibly detaching it (in the usual way) from a stone, diffused a copious mucus. Acontia were also abundantly protruded, and spread to double the diameter of the body on all sides, on the bottom of a saucer in which I had placed it. After a while the whole of this mucus over the same area *was of a delicate but decided roseate hue*, as seen on the white china. The acontia are very densely filled with *cnidæ*, of two kinds, chambered and unchambered. The former are $\frac{1}{500}$th of an inch in length, linear-ovate, of a clear pale yellow hue, highly refractile, with a long parallel-sided chamber, extending through three-fourths of the cnida. It discharges a wire (*ecthoræum*) about one and a half times its own length, furnished for the distal two-thirds with a screw of two (or three) spiral bands, closely set, and forming an angle with the axis of 30°: the bands are clothed with reverted barbs. The unchambered cnidæ are $\frac{1}{900}$th of an inch long, of a similar shape, shooting a wire to eight times its own length, which is attenuated to a fine point, and is furnished with a single screw-band, unbarbed.

When out of water, *miniata* has the habit of protruding the wall of the stomach, almost to as great an extent as *B. crassicornis*. This is specially seen when the specimens hang from the perpendicular face of a rock.

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* See the General Introduction, for a full description of these organs.

According to Mr. Holdsworth, *S. miniata* increases by spontaneously separated fragments of the base, like *A. dianthus*. He says,—"I have had two young ones of *miniata* produced from bits of the base detached from a large specimen, which had been fixed for a long time. It was anchored too firmly; so it cut its cable, and started for fresh quarters." According to the same careful observer, double individuals are not uncommon—a fact which points to a more decidedly fissiparous habit.

The following note contains all the original information that I possess of the generative process. Examining a small specimen, about the middle of August, I found that it had given birth to several ova or gemmules. I had just removed it from a stone in one of my tanks, to which it had been attached many months. It had protruded the filaments copiously, and these were now partially retracted and coiled up, forming a white coat almost entirely investing it. Under a one-inch objective, as these were twining and twisting, I saw among them several olive-yellow bodies, which seemed to have a motion independent of the filamental currents; and I isolated one. It was of a sub-nautiloid form, irregularly convolute, much like a *Bursaria*, about $\frac{6}{1000}$ths of an inch in long diameter, $\frac{4}{1000}$ths in lateral, and about $\frac{3}{1000}$ths in transverse; of a dull clear olive, but granular, richly clothed everywhere with small cilia, by means of which it revolved freely in all directions. Others which I saw were much less than this one.

Dr. T. S. Wright, however, seems to have witnessed the birth of perfectly-formed young. "Four young ones," he observes,* "produced by as many specimens of *Actinia*

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* Proc. Roy. Phys. Soc.

ornata [=*Sag. miniata*] in the last six months, were born with a double row of tentacles, the inner long, the outer short, and tinged with orange-red as in the adult."

This beautiful species is easily reconciled to captivity, and is hardy. I have kept individuals for long periods. It expands freely. It ought to be placed on a worm-eaten piece of rock, but it does not require so deep a hole as *bellis*. The rich hue of the column, in some varieties, makes it desirable that this should be visible.

The following list of localities marks the range of the species as at present known. I am not aware that it has been found out of Great Britain.

Deal, *Rev. H. H. Dombrain:* Weymouth, *P. H. G.:* Torquay, *P. H. G.:* Dartmouth, *E. W. H. H.:* Plymouth, *Dr. G. Dansey:* Ilfracombe, *W. A. Lloyd:* Tenby, *P. H. G.:* Menai Strait, *W. A. L.:* Hilbre Island, *E. L. W.:* Arran, *T. S. W.:* Cumbrae, *D. R.*

bellis.
MINIATA.
rosea.
ornata.
ichthystoma.

THE ROSY ANEMONE.

Sagartia rosea.

PLATE I. *Figs.* 4, 5, 6.

Specific Character. Tentacles all rose-coloured; the first row sometimes with a broad dusky bar above a narrow one at the foot.

Actinia rosea.	GOSSE, Devonshire Coast, p. 90, pl. i. figs. 5, 6 (var. *vinosa*).
pulcherrima.	JORDAN, Ann. N. H. Ser. 2, vol. xv. p. 86 (var. *pulcherrima*).
vinosa.	HOLDSWORTH, Proc. Zool. Soc. 1856 (var. *vinosa*).
Sagartia rosea.	GOSSE, Tenby, p. 365. Frontisp. (var. *Demetana*).

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks: scarcely exceeding the column.

Column. Minutely corrugated, studded on the upper half with suckers, to which fragments of gravel or shell occasionally adhere. Substance fleshy. Form in expansion elongate, cylindrical.

Disk. A shallow cup, the margins occasionally undulate. Radii strongly marked, and covered with transverse striæ.

Tentacles. Moderately numerous, in four or five rows, nearly equal in length (but this varies according to the variety); often arching regularly over the margin, but sometimes very small and forming a fine fringe.

Mouth. Not raised on an obvious cone, often apparently four-lobed. Lip crenate.

Acontia. Emitted copiously.

COLOUR.

Column. Deep brown, inclining more or less to dark red, paling to buff at the base. Suckers pale buff or whitish.

Disk. Pale silvery olive, without markings, except an ill-defined dusky margin, produced by the blending of the bands that cross the foot of each tentacle.

Tentacles. Clear rose-red or rose-purple, very brilliant; those of the outer row showing a slight tendency to lilac. Those of the first and second rows are crossed at the foot by two undefined dusky bars, sometimes obsolescent, of which the upper is the thicker.

Mouth. Lip white; or light pink.

SIZE.

It occasionally rises to a height of an inch and a half; and the diameter of the tentacular flower is about an inch.

LOCALITY.

The south-west corner of Great Britain: in holes and rock-pools at low water-mark.

VARIETIES.

α. *Vinosa.* The condition described above, which is that to which the specific name *rosea* was first applied, and which appears to be the most widely-spread variety. (Plate i. fig. 4.)

β. *Pulcherrima.* Column cream-white, merging towards the summit into pale olive. Disk cream-white, with dark lines between the radii. Tentacles crimson-lake, with several (more or less distinct) darker bars; those of the first row thicker, usually carried erect, or arching inwards. (Plate i. fig. 6, which is copied from a beautiful drawing with which Professor Jordan has favoured me.)

γ. *Erythrops.* Column dark brown, inclining to olive, with conspicuous pale suckers. Disk brilliant orange-scarlet. Tentacles rather short, stout, bright rose-lilac, the bands across the foot well defined. A very lovely variety, which I have found near Torquay.

δ. *Demetana.* Small and low, rarely exceeding half an inch in height or diameter. Column rich red-brown, with inconspicuous suckers. Disk crimson, often with a tinge of orange, usually more or less puckered at the margin. Tentacles crimson, short, crowded, resembling a compact fringe. (Plate i. fig. 5.)

For the first and second of these varieties, I have retained the names proposed respectively by Mr. Holdsworth and Professor Jordan, who described them as species under these appellations. I am quite sure that both must be referred to this species. The fourth is the form so abundant on the Pembroke coast; a very marked variety, to which I have assigned a name alluding to the Δημηταὶ, the ancient inhabitants of that part of Wales. All are beautiful; but perhaps *pulcherrima*, as its name imports, is the loveliest of all.

There is no doubt that *S. miniata* and *S. rosea* approximate in some of their varieties very closely; and I have had many doubts about the propriety of keeping them separate. I have seen, in the vicinity of Tenby, specimens, in which some of the small tentacles of the outer row had a scarlet or orange core, and yet in no other respect could I distinguish them from the true *rosea.* Normal *roseæ* and normal *miniatæ* were abundant on the same rock (the Woolhouse-rock) within a few feet; which fact suggests the possibility of hybridization. Besides the scarlet-cored tentacles, *miniata* may be described, in those varieties which come nearest to *rosea,* as darker externally; as growing to a far larger size; as being lower and less pillar-like; and as having a much more lax, flaccid habit of body.

The *quæstio vexata,*—What constitutes a species? what a variety? is one which it is much easier to answer theoretically than practically. Some have proposed certain arbitrary canons, such as that assumed by Mr. Tugwell, that *form* distinguishes the species, *colour* only the variety. But this is quite untenable. In many instances colour is not only specific, but even generic;—as black, white, and red, in well-recognised patterns and in certain fixed regions of the body, in the Woodpeckers; black, yellow and red, again in certain patterns, in *Papilio;* yellow, red and white in the *Pieridæ.* Indeed, our entomological friends would be sorely puzzled to define their species, if colour were denied them as a distinction. In the Butterflies alone, hundreds of indubitable species rest exclusively on colouring. The fact is, anything may be a specific character, provided it be *constant.* Constancy, permanency, is what we require; let us only indicate any mark that is *invariably* found,—no matter whether it be colour, form, pattern, surface, sculpture, or any thing else; or any combination of these, and we have a good specific character. I believe, with Mr. Wallace, that "the two doctrines of 'permanent varieties' and of 'specially created unvarying species' are inconsistent with each other."* In other words, I would say a species is permanent, a variety transitory. There is no doubt, however, that the latter may be maintained within certain limits by breeding in and in; though there will always be a tendency to revert to the original and normal character, which marks the permanent species.

Though I believe this distinction to be a good one, it does not therefore follow that we can put it in practice without any difficulty. We find a specimen;—we know nothing of its antecedents;—at most we can trace it only through a few generations; and thus we are precluded from applying our test of permanency to it. The only resource is the practical skill and judgment which experience and observation gradually give; and these, as they cannot be communicated to another, nor be reduced to formulæ, differ indefinitely in individual cases. In the present work I must beg my readers to believe that I use the best light I have, to arrive at right conclusions.

Under all its variations, which are not very numerous, *S. rosea* is a lovely little species. When left by the receding tide, it protrudes from its tiny cavity in the overhanging rock, and droops, a pear-shaped button of orange-brown, with a cluster of brilliant purple tentacles just showing their tips from the half-opened centre, and a drop of water sparkling like a dew-drop, hanging from them. Then it is beautiful. But a more charming sight is seen when, as at the rock near Lidstep, or on the Woolhouse reef, you gaze down into a narrow basin worn by the waves of ages in the solid limestone, and, having first carefully lifted the broad fronds of *Laminaria* and *Rhodymenia*

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* Zoologist, p. 5883.

palmata that spring from the edges, you see the dark brown walls and bottom of the pool,—which is filled to the brim with quiet crystal water,—all studded over with the expanded disks of *roseæ*, *niveæ*, and *venustæ*. Then indeed the sloping sides and bottom resemble a parterre, of which these are the lovely flowers; while the tufts of green, brown and purple Algæ that spring up everywhere around, some like moss, some like fantastically cut leaves, may well serve for the foliage of the "fairy paradise."

> "——— In hollows of the tide-worn reef,
> Left at low water, glistening in the sun,
> Pellucid pools, and rocks in miniature,
> With their small fry of fishes, crusted shells,
> Rich mosses, tree-like sea-weeds, sparkling pebbles,
> Enchant the eye, and tempt the eager hand
> To violate the fairy paradise."

It is equally attractive in those imitations of such rock-pools, which we make in glass tanks and china pans for our drawing-rooms. But, like the other species of the group to which it belongs, it is a somewhat precarious tenant of the Aquarium. I have kept at different times a large number of specimens; but none of them, so far as I can remember, survived a twelvemonth's captivity. A dark-coloured mass of rock suits it best, serving as a background for its rich crimson blossom. It loves the shadow, too; and should therefore be placed on the side farthest from the light. A rough perpendicular surface is very appropriate for it.

The Rosy Anemone occasionally protrudes the walls of the stomach, like *B. crassicornis*, which then overlap the disk in large furrowed pellucid lobes. It sometimes distends the tentacles till they are translucent, and then it is not uncommon to see the free ends of the acontia, lying within these organs in coils, having penetrated through the open base of the tentacle from the intersepts of the body-cavity. One may sometimes also discern fragments of the same filaments, which have become accidentally detached, driven to and fro at the tip of the interior of the tentacle. The proper ciliary motion of these twisted atoms combining with the motion produced by the lining cilia of the tentacle-wall, gives them the fitful vacillating action of spontaneous volition; so that they may readily be mistaken for living worms accidentally imprisoned. The acontia are emitted from the pores of the body in great profusion upon irritation. The form and armature of their *cnidæ* do not differ from those in the species last described.

The following are the localities of the Rosy Anemone known to me:—

Guernsey, *E. W. H. H.:* Teignmouth, *R. C. R. J.:* Torquay, *P. H. G.:* near Paignton, *Rev. W. F. Short:* Dartmouth, *E. W. H. H.:* Tenby, Lidstep, St. Gowan's Head, *P. H. G:* Bantry Bay, *E. P. W.*

miniata.
ROSEA.
venusta.
nivea.

THE ORNATE ANEMONE.

Sagartia ornata.

PLATE II. *Figs.* 9, 10.

Specific Character. Basal region of the tentacles, and the outer region of the radii blackish: a white bar across the former, and a white cordate spot on the latter.

Actinia ornata. HOLDSWORTH, Proc. Zool. Soc. 1856. Pl. v. figs. 5, 6, 7, 8.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to the roots of *Laminaria:* slightly exceeding the column.

Column. Minutely corrugated; studded on the upper half with suckers, more numerous as they approach the summit. Form in expansion elongate, cylindrical.

Tentacles. Moderately numerous, in five rows; those of the first row rather stoutly conical, comparatively short; the rest diminishing rapidly as they approach the margin.

Mouth. Not raised on an obvious cone. Lip tumid.

Acontia. Emitted freely.

COLOUR.

Column. Dark orange-brown, paler at the base. Suckers pale.

Disk. Central moiety pale orange, changing to a rich purplish brown on the outer moiety. The radii of the first and second rows of tentacles separated by narrow yellow bands slightly diverging "as they proceed outwards, and at their extremities partially surrounding the bases of the tentacles, according to the following arrangement. The first tentacle may be said to arise from the space *between two pairs* of bands, the second being situated *within the pair;*[*] the band bifurcates near its extremity, and incloses the third tentacle: these branches again divide and form a similar inclosure for the tentacles of the fourth row:[†] beyond these is a set of very short tentacles; these, as far as I have been able to examine them, are not connected with the yellow bands." On each primary radius is a large heart-shaped spot of cream-white, well defined, in the midst of the dark-brown; and on each secondary radius a similar spot, but more elongated, and situate a little more remote from the common centre.

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[*] The apparent distribution of the bands *in pairs* is merely a necessary result of the fact that the secondary radii are narrower than the primary.

[†] Hence the yellow bands are doubtless the united radii of the tertian and quartan series.

Tentacles. Dark brown at the base, becoming paler toward the tip, encircled by three white rings, of which the basal one is very distinctly defined.

Mouth. Lip pink; frequently conspicuous.

SIZE.

About three-fourths of an inch in height when extended; flower half an inch in diameter.

LOCALITY.

The entrance of Dartmouth harbour, in the laminarian zone.

VARIETIES.

a. Fusca. The condition above described.

β. Rubida. The brown on the tentacles and certain parts of the disk replaced by various shades of red.

TENTACLE
(*front view*).

This attractive little Anemone appears to have been seen only by Mr. Holdsworth, who described it in detail, with accompanying drawings, in a Memoir read before the Zoological Society of London, Dec. 11th, 1855. From those details, as published in the Society's proceedings, I have compiled the above description, merely throwing them into that order of arrangement, which, for convenience of reference, I have adopted in this work. I have been aided, however, by the original beautiful drawings, which my friend has liberally placed in my hands. From these, the figures in Plate II. have been likewise copied; fig. 9 representing the flower, fig. 10 the button.

"This species," as its discoverer observes, "is chiefly remarkable for the beauty of its oral disk, which, for colouring and elegance of marking, will bear comparison with that of any of the larger kinds. . . . Several examples were obtained at extreme low-water mark, from a large mass of detached rocks known as the Mewstone, near the entrance to Dartmouth Harbour. They were met with on two or three occasions, but were always found nestling among the roots of *Laminaria digitata.*"

The variety *rubida* was described in the same paper. Six specimens were found among the roots of a *Laminaria* sent to Mr. Holdsworth from the same locality. He could find no other difference of importance, than the substitution of red for brown above-mentioned. From a private communication with which he has recently favoured me, I learn that he failed to discover any more specimens of either variety, though he subsequently searched the same locality.

rosea.
ORNATA.
ichthystoma.

THE FISH-MOUTH ANEMONE.

Sagartia ichthystoma.

(*Sp. nov.*)

PLATE II. *Fig.* 7.

Specific Character. Tentacles minute, marginal; each having two narrow black bars across the foot.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks or shells: not exceeding the column.

Column. Coarsely corrugated, with no (observed) suckers. Form (in button) low, nipple-like, with a coarsely-puckered involution; (in flower) cylindrical, in height about equal to its diameter.

Disk. A shallow saucer; with radii strongly marked; the margin slightly exceeding the diameter of column.

Tentacles. Moderately numerous, arranged in three rows, set very close to the margin of disk; nearly equal in size, very small, short, and conical.

Mouth. Set on a large cone. Lip very tumid, coarsely furrowed.

COLOUR.

Column. Brownish-scarlet, becoming pale towards the top, and tinged with purple at the very summit.

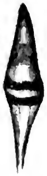
Disk. Pale fawn or bay, with numerous radiating lines of black, so thick at the outer half of the area as to give the effect of a broad, black, slightly-interrupted ring. A pair of gonidial radii, opposite, white.

Tentacles. Pellucid white, marked at the foot with two close-set, narrow bars of black, and a broad ill-defined ring of dusky near the middle. The radial lines of black wind sinuously among the tentacles, on the pale ground of the disk, with a distinct and pretty effect.

Mouth. Lip deep rich scarlet.

SIZE.

Button half an inch in height. Flower three-fourths of an inch in diameter.



TENTACLE (*front*).

LOCALITY.

The south coast of England: deep water; low rocks.

VARIETIES.

α. *Stibista.* The condition above described.
β. *Astimma.* Disk dull olive-grey. Lips dull brick-red.

I know this little Anemone only by two specimens. The first (of the variety *stibista*) I found on an oyster in the fish-market at Weymouth, in the summer of 1853. As the oysters with which the market was supplied were brought in by a trawler, whose fishing grounds were West Bay, and the offing of Weymouth Bay, we may safely set down one of these as the native locality of my little prize.

The second specimen, which exhibited that measure of diversity in colour, that I have set down as distinctive of the variety *astimma*, but exactly agreed with the former in all its other characters, and was manifestly, at the first glance, of the same species, was sent me from Torquay, in April, 1856, by the Rev. W. F. Short. I understand it was taken at the insular rock known as the Ore Stone.

Though less showy than the former specimen, whose black-lined face and pouting scarlet lips made it very attractive, this latter was still very pretty; and it proved to be easily reconciled to captivity, for it remained in one of my tanks,—sometimes under rather unfavourable conditions of the water,—from the 10th of April, 1856, to the middle of August, 1857, a period of sixteen months. Nor have I any reason to believe that it would have died then, but for my own carelessness; for having taken it out of the tank to examine it, I incautiously left it, after my observations, exposed in a saucer to the midday beams of a hot August sun, and found it, of course, killed, when I looked at it again.

The *acontia* contained, as usual, both unchambered and chambered *cnidæ*. The former were linear-oblong, $\frac{1}{800}$th of an inch in length, discharging an *ecthoræum*, four times as long as themselves, surrounded with a single spiral band. The latter were of the same form, but twice as long and wide, discharging an *ecthoræum* very little longer than themselves, in which I could not discern the least trace either of barbs or screw. The *acontium* was taken, certainly, from the specimen last mentioned, when it was either dying or dead, decomposition having commenced; but the investing cilia were in parts still active, and the *cnidæ* discharged vigorously, just as when alive.

In both varieties the small, conical, pointed tentacles projecting very regularly from the margin, impart a peculiar and well-recognised character to the species. These organs so strongly resembled the little sharp teeth crowded round the jaws of some fishes, that I was induced to borrow a *nomen triviale* from that resemblance. The appellations of the varieties allude, as my classical readers will have perceived, to the long-standing custom among the Oriental ladies (nor altogether unknown to the dandies of ancient Rome*) of staining the eyelids with *stibium*, a preparation of antimony, for the purpose of imparting a soft voluptuous languor to the eyes. Jezebel "put her eyes in painting" (2 Kings ix. 30; *marg.*).

ornata.
————? ICHTHYSTOMA. B. crassicornis.
———?
miniata.

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* See Pliny, Nat. Hist. xi. 37; Juv. Sat. ii. 93.

THE ORANGE-DISKED ANEMONE.

Sagartia venusta.

PLATE I. *Fig.* 7.

Specific Character.	Disk orange; tentacles white.
Actinia venusta.	GOSSE, Ann. N. H. Ser. 2, xiv. 281.
Sagartia venusta.	IBID., Linn. Trans. xxi. 274. Tenby, 358; pl. xxiii. figs. a, b.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; little exceeding the column.

Column. Smooth, or very minutely corrugated; studded on the upper half with suckers, which are not raised on conspicuous warts. Substance fleshy. Form cylindrical, the height rarely exceeding the diameter.

Disk. Flat or slightly concave; the margin somewhat undulate. Outline often ovate. Radii inconspicuous.

Tentacles. About two hundred or upwards, set in about four indistinct rows; the inner ones about as long as the diameter of the disk, the outermost small and close-set; slender, acute, somewhat flaccid.

Mouth. A simple orifice without cone, or distinct lip; frequently thrown into lobes. Throat ribbed.

Acontia. Emitted copiously and freely.

COLOUR.

Column. Warm brown, varying from deep buff, to full rich brown-orange, often paler towards the lower half, where traces of alternate longitudinal bands of pale and dark tint are sometimes visible. Suckers whitish.

Disk. Wholly of a most brilliant orange, without markings.

Tentacles. Pure white, without markings, except that the colour is generally pellucid at the foot and at the tip, and more or less opaque in the middle.

Mouth. Paler than the disk. Ribs of throat white.

SIZE.

A full-sized specimen well expanded is about three-fourths of an inch in diameter of disk; but the extended tentacles may increase this to an inch and a half, or rather more. The height rarely exceeds three-fourths of an inch.

Locality.

Various points in the south and west of Great Britain and Ireland. In Scotland it has not been recognised. Hollows in perpendicular and overhanging rocks, exposed at low water: dark tide-pools.

Varieties.

The variation seems to be limited to the greater or less depth of tint in the column.

This most elegant species was first met with by myself in the neighbourhood of Tenby, where it is so abundant as to be quite characteristic. It has since been found in several other somewhat remote habitats, but nowhere in anything like the profusion in which it occurs in that its first recognised home. I am justified therefore in considering South Wales the metropolis of the species. It occurs all along the south coast of Pembrokeshire, at least from Monkstone Point to St. Gowan's Head; but is more than usually numerous in the fine perforate caverns of St. Catherine's Island, that form such an attraction to Tenby visitors, and in the hollows and erosions of that rich preserve of zoophytic game,—the Woolhouse Rocks.

The Orange-disk is essentially a cave-dweller; almost invariably choosing for its residence some crevice or cranny, or one of those little cavities made by boring mollusks, with which the limestone on those coasts is generally honeycombed. Occasionally, indeed, we find it in shallow pools, with a bottom of impalpable mud, the detritus produced by the action of the waves on the surrounding rocks; but in such cases it will be invariably found that the Actinia is attached to a hollow in the solid floor of the pool, protruding its body through the deposit by elongation, and expanding its beautiful disk on the surface. Owing to this troglodyte habit, it is, like many of its congeners, rather difficult to procure, notwithstanding its abundance, as it must be chiselled out,—an operation, which, from the great hardness of the compact limestone, is both tedious and precarious.

Hundreds might be seen* in the largest of the caverns just alluded to, hanging down from the walls during the recess of the tide; the button elongated to an inch or more. And almost every dark overarched basin hollowed in the sides of the caves, or in similar situations, at Lidstep, at St. Margaret's Island, and under Tenby Head, each filled to the brim with still crystalline water, had its rugged walls and floor studded with the full-blown blossoms of this and cognate species.

As a specimen of the exceeding richness of these "gardens of the Nereids," wherewith our iron-bound coasts are adorned, I shall take the liberty of citing the description of one, as it appeared to myself in the vicinity of which I am speaking. It was on the face of the bluff castle-crowned promontory known as Tenby Head.

"After scrambling over many rough ridges, we come to a perpendicular wall of rock some twenty-five feet high, jutting out from the cliff right across our way; its foot washed by the sea, which is evidently of considerable depth, its summit tapered to a sharp edge, and the whole side holed, and furrowed, and honeycombed, and covered with barnacles to the very top.

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* I use the past tense; for alas! it is so no more. When I revisited Tenby in 1856, I found that these caves, and almost every accessible part of the neighbouring coast, were pretty well denuded of the lovely animal-flowers, which, in 1854, had blossomed there, as in a parterre. I fear that the hammers and chisels of amateur naturalists have been the desolating agents; and my friends tell me, not without a semi-earnest reproachfulness, that I am myself not guiltless of bringing about the consummation. If the visitors were gainers to the same amount as the rocks are losers, there would be less cause for regret; but owing to difficulty and unskilfulness combined, probably half a dozen Anemones are destroyed for one that goes into the aquarium.

"On the south side of this wall, almost at its base, on a rough mass of rock so covered with luxuriant tufts of Dulse (*Rhodymenia palmata*) as to be richly empurpled with it, I found a little basin, somewhat irregular in outline, but rudely oval, about a foot long, eight inches wide, and six inches deep; in other words, about the size of a soup-tureen. It was much obscured by overhanging drapery of *Fucus;* but, on lifting this, I was astonished and delighted with the profusion of animal life, whose gay and varied hues gave to the tiny area the appearance of an artist's newly-rubbed palette.

"Lest I should seem to exaggerate if I reported the contents of this basin from memory, I took the trouble to count the specimens, noting each sort in my pocket-book on the spot. Their numbers were,—nineteen of the brilliant Orange-disk (*Sagartia venusta*), and twelve of the Snowy (*S. nivea*), all fully blown; besides two large Shore-Crabs (*Carcinus mœnas*), a Shanny (*Blennius pholis*), a *Cynthia*, several *Sabellæ*, a group of *Sabellaria alveolata*, some very fine masses of *Botrylloides*, and many specimens of the Crown Sponge (*Grantia ciliata*).

"Nor was this extraordinary pool less rich in its botany than in its zoology. *Chondrus crispus*, finely tipped with steel-blue, as usual; the Common Coralline (*Corallina officinalis*), purpling the sides and bottom; some small fronds of *Rhodymenia palmata*, and one or two tiny ones of *Laminaria saccharina*,—which is particularly pretty while it is young,—were there; as also two other kinds of superior elegance, namely, *Delesseria ruscifolia*, with its oak-like leaves of fine dark crimson, and the pretty rich-green feathers of *Bryopsis plumosa*. Besides all these, there were other plants and animals of less note, which I did not enumerate."*

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* Tenby; a Sea-side Holiday; 96, *et seq.*

I think it more than probable that the long deep Atlantic fiords of the sister island, will, on examination, prove at least to equal, if they do not greatly surpass, in the luxuriance of their marine zoology and botany, anything that we can boast in England. As a companion to the above, I gladly give an Irish picture of *S. venusta*, *in situ*, sketched by the graphic pen of my friend Dr. E. Percival Wright, the able and energetic Director of the Dublin University Museum.

"Last August, while entomologizing with Messrs. Haliday and Furlong in Killarney and Glengariff, we made one day's excursion down Bantry Bay—a famed spot, but, with all its fame, it has never been worked. Well; the weather was bad,—very bad; a thick mizzling rain soon bespangled us with heavy dew-drops: however, pulled by four good oars, we did get on. The tide being right against us, it was hours ere we reached some remarkable caves,—the chief object of our trip.

"Thousands of the dark olive-green *Actinia mesembryanthemum* lined these caves. It was not safe to try to land; but in places where the sea, owing to shelter, was quiet, I could see the sea-floor covered with an extraordinary luxuriance of Actiniæ, Sponges, &c.;—their colours, and forms, of course, distorted by every ripple of the waves.

"We did land for a few minutes on one spot; and, even at Tenby, and under St. Catherine's Rock, I never saw so much in the time; and this, though I did not wander from a single rock-pool. In it I saw about four and twenty specimens of *Echinus lividus*, all comfortably sitting in arm-chairs nicely cut out of stone, and most of them of a lovely purple tint. Down the centre of the pool ran a narrow fissure quite choked with *Bunodes crassicornis*, which, as is their wont, had managed to gather all the little broken *débris* of shells, and to stick them over their bodies, in the way children stick broken china on heaps of mud, in our Irish villages.

"But new to me as was *E. lividus*, and splendid as the really fine *crassicornes* were—they were of that pretty healthy white and pink variety—yet they were surpassed by your *Sag. venusta*, which with *S. rosea* sprouted out of every fissure. The former is, I think, the most exquisite of our Irish Anemones. In your figure in 'Tenby,' the tentacles are hardly white enough, and no painting can do justice to the clear orange. Book it and *S. rosea*, *both* very distinct from any other of our species. I saw other Anemones that I suspect will turn out new species; but what could twenty minutes and an insect-net effect in 'catching' such things as Sagarts? Why, touch them roughly and—they're gone! If spared, I will visit them again; and you shall see them, I hope, too: for if I spend a month in Bantry Bay, say next June or July, I can easily send you my Actinia captures;—that is, if you won't visit Ireland. It is as pleasant as Jamaica."

To turn from these tempting scenes of wild nature;—our beautiful Orange-disk is easily made happy in captivity: where, indeed, fed daily by fair fingers, and admired by bright eyes, it would argue badly for its temper if it were not. It is soon at home, and becomes one of the most brilliant ornaments of the Aquarium, expanding its lovely disk freely, fringed with its elegant border of snow-white tentacles, and thus making up in beauty what it lacks in size. It will survive an indefinite period, if it receive a moderate degree of attention. The observations which I have made on the treatment of *S. rosea* will apply with equal force to this species and to the following.

Mr. Holdsworth informs me that he has witnessed the production of new individuals from fragments spontaneously detached from the base, in *S. venusta*, as before described in the case of *A. dianthus.* Miss Loddiges has favoured me with information of the same phenomenon in this species.

The following are the localities known to me as inhabited by the Orange-disk:—

Guernsey, *Dr. J. D. Hilton :* (on Laminariæ washed up) *Miss Guille :* Torquay, *P. H. G. :* Clovelly (on oysters from deep water), *Rev. C. Kingsley:* Morte Stone, *G. T.:* Lundy, *G. T.:* Tenby, *P. H. G.:* St. Gowan's Head, *P. H. G.:* Puffin Island, *E. L. W.:* Bantry Bay, *E. P. W.:* Belfast (abundant), *C. Bosanquet.*

This species has close relations with *S. nivea.* Its colouring, however, so far as I have seen, is constant, without any approach to albinism; and its tendency to an ovate outline also distinguishes it, though less satisfactorily. It may possibly be found hereafter that the two constitute but a single species; but in the absence of any intermediate condition, I think it best to consider them distinct.

miniata.
VENUSTA.
nivea.

THE SNOWY ANEMONE.

Sagartia nivea.

PLATE II. *Figs.* 1, 8.

Specific Character. Disk and tentacles opaque white, without markings.

Actinia nivea. GOSSE, Devonsh. Coast, 93; pl. i. fig. 8.
Sagartia nivea. IBID. Trans. Linn. Soc. xxi. 274. Tenby, 368, Frontisp. Annals N. H. Ser. 3, vol. i. p. 415.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; little exceeding the column.

Column. Smooth, or slightly corrugated: studded on the upper half with suckers, which form somewhat conspicuous warts. Substance fleshy. Form cylindrical; the height often exceeding the diameter.

Disk. Flat or slightly concave; the margin scarcely undulate. Outline circular. Radii conspicuously marked.

Tentacles. About two hundred, arranged in four distinct rows; of which the first and second contain each twenty-four; the third forty-eight; and the fourth, which is marginal, about one hundred. Those of the first row, when extended, are about as long as the diameter of the disk; the others diminish gradually, the outer row being small, and often papillary.

Mouth. Sometimes raised on a cone, which at other times disappears; frequently thrown into lobes. Lip slightly tumid. Throat ribbed.

Acontia. Emitted freely and copiously.

COLOUR.

Column. A light olive drab, slightly varying in intensity; becoming paler towards the lower half, which is often marked with alternate longitudinal bands of white and drab tint. Suckers whitish.

Disk. Opaque white without markings, except that, when fully expanded, a grey tinge spreads in a circle, near the bases of the tentacles. Occasionally a very faint tinge of yellow surrounds the mouth.

Tentacles. Pure snow-white, opaque, except when much distended with water; without any markings either on the body or around the foot.

Mouth. Lip and throat pure white.

SIZE.

Large specimens attain the thickness of an inch, the height of an inch and a quarter, and the diameter of an inch and a half, when fully expanded.

LOCALITY.

The south-west coast of England. Crevices and rock-pools.

VARIETIES.

α. *Immaculata.* The condition above described.

β. *Obscurata.* Disk tinged with faint greyish-olive; the tentacular region smoke-grey, undefined. This variety sometimes has the column of that rich orange-brown hue which is characteristic of this group.

It was on the north side of the limestone promontory known as Petit Tor, on the south coast of Devon, that I first met with the Snowy Anemone, in the spring of 1852. The rock here is hollowed into large cavernous pools, isolated only at very low tides, and dark with the shadow of the slimy sponge-covered precipices that arch over them; where *Laminariæ* grow abundantly, affording many a nidus for profuse forests of parasitic Hydroids of the genera *Sertularia*, *Plumularia*, and *Laomedea*. The little red siphons of thousands of *Saxicavæ* hang down from the holes which they have excavated in the solid limestone, each terminated by a diamond drop of water, awaiting the moment when the returning tide shall cover their abodes, and restore to them activity and enjoyment. It is their season of periodical idleness and repose. Among the roughnesses of the rock, and the conical papillary pores of the sponges, which, olive, yellow, and scarlet, stud the surface,—green Nereidous worms glide along, in and out, by means of the curious packets of slender bristles, alternately projected from every segment and withdrawn, that serve them instead of feet. Below the water-line, that is to say, the level of the lowest part of the margin of the pool, which of course never varies, such animals and plants as require to be perpetually covered with water enjoy circumstances suited to their wants. In the deepest shadow, fine specimens of the fleshy Dulse (*Iridæa edulis*), and the lovely leaf-like *Delesseria sanguinea*, display their crimson fronds in copious tufts; plants that cannot bear the absence of water, their delicate leaves becoming orange-coloured in large patches, which soon die and slough away,—if left unbathed even for a single tide. The curious white Cows' paps (*Alcyonium digitatum*), all studded with their clear glassy polypes, project from the rock; and here I saw several white *Actiniæ*, which at once attracted my notice, though beyond my reach, on the opposite side of the pool. At length, however, by searching in another smaller pool, to which I could gain access, I found, beneath the drooping Oarweeds, one of the white *Actiniæ* within reach. It was three or four inches beneath the surface; so that to procure it, it was needful to bale out the water to that depth, which I effected by the aid of one of my collecting jars, and then to cut out the animal's cell with the steel chisel. I was, however, sufficiently repaid for the labour by the beauty of this snow-white Anemone.

After an absence of nearly six years, I visited this interesting spot again. It had often been a subject of speculation with me whether the minute features of a rocky coast change rapidly under the action of weather and sea; and I had looked forward to this visit with interest, as likely to afford me data for determining the question. *The shore was as if I had left it but yesterday.* Everything appeared as if it had been untouched: every tide-pool, every projection, I recognised: the broad cleft that I have described (Devonsh. Coast, p. 34); the little basins within it; the slight projections on the face of the cliff by means of which

I scrambled across, just as of old; the farther chasm (p. 39); and the large dark tide-pool in which I had seen the Prawn; —all were exactly as when I first made acquaintance with them six years ago. This last pool is still fringed with Oarweeds crowded with *Laomedea* forests, and the farther walls are still spotted over with daisy-like Snowy Anemones, just where I saw them first, and in all probability the very same identical individuals.

But in the interim I had become familiar with the fair *nivea*, in what I may call its metropolitan home. It is in the numerous caverns and dark rock-pools into which the limestone formation on the Pembroke coast is hollowed, that this lovely species is seen to advantage; especially in the dark holes of Monkstone, the Caves of St. Catherine's and St. Gowan's, and the overshadowed pools of Tenby Head and Lidstep. Here, as we peer into the clear water of these obscure wells, we see the Snowy Anemone studding the rugged sides by hundreds, like bright stars on the midnight sky, singly and in constellations. Here, too, swarm its congeners and companions, the equally lovely *rosea* and *venusta;* and this trio of graces are the very gems of the Demetian rocks.

When covered by water, *nivea* expands freely, and continues long unfolded; but, in situations where it is left by the tide, it either withdraws into its hole, or, if this be placed on the side of a perpendicular or overhanging rock, it hangs out in the form of a lengthened wart, with a drop of water depending from its drooping head, like a dewdrop, in the centre of which a speck of white reveals the peeping tips of the contracted tentacles.

Mr. Holdsworth has observed in this species that curious form of elongation of the tentacles described under *S. miniata*. Here, however, no fewer than ten or twelve of the tentacles of the first and second rows hung down, *straight and motionless*, to a distance of two inches from the disk. They were attenuated towards the middle, enlarging again on nearing the tip, which was truncate in some, rounded or obtusely pointed in others. Corrugation was present in some, but was rather difficult of detection, owing to the absence of colour. It is probable that this peculiar condition of the tentacles may be accompanied with functions distinct from those of the mere elongation, such as has been described under *S. bellis*. (See *ante*, p. 35.)

This species bears a far closer resemblance to a daisy, both in size and colour, than that which has obtained possession of the name. Indeed, one can scarcely see a group of *niveæ* and *venustæ* under water, especially among the small mossy growth of grass-green Algæ,—*Bryopsis, Conferva, Calothrix, Enteromorpha*, &c.,—without being forcibly reminded of a crop of daisies on a lawn.

Mr. Holdsworth finds it "not uncommon at Dartmouth, but usually small; inhabiting crevices in steep rocks under sea-weeds; at Guernsey, in sheltered nooks, very fine."

The young do not differ from the parent, except in size and in the number of the tentacles. An infant specimen that was born in one of my aquaria, adhered by the base immediately, and presently expanded. It displayed twelve tentacles, set in six pairs; each pair being nearly parallel, and separated by a marked interval from the pair on either side.

Nivea rivals *miniata* in the profusion with which it shoots forth its poison-bearing *acontia*, on the slightest irritation. They are moderately crowded with *cnidæ*, mostly of the chambered kind, discharging an *ecthoræum* little longer than themselves, densely armed with reverted barbs, which impart the brush-like form so characteristic of this genus.

Most of the recognised habitats of the species have been already mentioned incidentally: they may, however, conveniently be tabulated.

Guernsey, *E. W. H. H.:* Torquay, *P. H. G.:* Dartmouth, *E. W. H. H.:* Clovelly (on oysters trawled), *C. K.*. Morte, *G. T.:* Ilfracombe, *P. H. G.:* Lundy, *G. T.:* Tenby, *P. H. G.:* St. Gowan's Head, *P. H. G.:*

venusta.
NIVEA.
sphyrodeta.

THE SANDALLED ANEMONE.

Sagartia sphyrodeta.

PLATE I. *Figs.* 8, 9.

Specific Character. Tentacles few, thick, pure white; the foot of each inclosed within a slender ring of purple, which passes off in a line towards the margin.

Actinia candida.	GOSSE, Devonsh. Coast, 430; pl. viii. figs. 11, 12, 13 ("The Purple Spotted Anemone").
Sagartia candida.	IBID. Linn. Trans. xxi. 274: Man. Mar. Zool. i. 28.
sphyrodeta.	IBID. Annals N. H. Ser. 3, vol. i. p. 415.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; expanded beyond the column.

Column. Smooth, without conspicuous suckers. Substance pulpy. Form cylindrical; the height in general slightly exceeding the diameter.

Disk. Flat or slightly concave; the margin entire. Outline circular. Radii distinct.

Tentacles. About forty-eight, arranged in four rows; of which the first and second contain each eight, the third and fourth each sixteen. Those of the first row are by far the largest, the size diminishing regularly to the external row: their form is stout and conical. They are usually spread horizontally, and have their tips frequently bent downwards.

Mouth. Raised on a conspicuous cone, which, however, is not permanent. Lip capable of great protrusion and distension.

Acontia. Emitted freely and copiously.

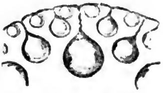
COLOUR.

Column. Marked longitudinally with many bands and narrow lines of opaque white, separated by interspaces, always narrow, of pale semi-pellucid brown, or drab. The summit is occasionally tinged with reddish-brown.

Disk. Opaque white, marked with five radiating lines of pellucid white. The tentacular region is marked with the ring-lines to be presently described.

Tentacles. Ivory white, without the least appearance of spots or bars: but at the very foot, where each tentacle springs from the horizontal disk, it is surrounded by a narrow ring of purplish, reddish, or dusky brown.

which is occasionally broken in front, but always passes off behind in a slender wavy line to the margin, where it slightly bifurcates. Frequently the ring dilates into an undefined spot at each *side* of the tentacle-foot. Sometimes the line passing off to the margin can be scarcely discerned beyond the second row, and sometimes the whole marking seems obliterated.


TENTACLES OF SPHYRODETA (*viewed vertically*).

Mouth. Pure white.

SIZE.

Half-an-inch in height, and about the same (or occasionally a little more) in expanse.

LOCALITY.

The south and west coasts of England. Low-water mark. Fissures in rocks; the under surface of stones.

VARIETIES.

α. *Candida.* The condition above detailed, which I originally described in my "Devonshire Coast" under this specific name.

β. *Xanthopis.* Disk assuming various shades of yellow, from a pale chrome or lemon-colour to a deep orange, or even dull vermilion.

This pretty little species was discovered by myself at Ilfracombe. It was during an unusually low spring-tide, in October, 1852. Specimens occurred at that time in two localities, having this in common, that in each case they were adherent to the perpendicular or overhanging surface of the cliff, at the very verge of lowest water. The animals were social: in the one case I found three individuals associated; in the other many dozens, a numerous colony thronging the approximating sides of a narrow fissure that runs far up into the solid rock at the seaward base of Capstone Promenade. A frequent tendency to a pendent posture was noticed; for even where the general surface of the rock was perpendicular, many of the Anemones were hanging from beneath the little points and projecting ledges.

In describing these specimens, I suggested the possibility that they might be referred to the *Actinia alba* of Mr. W. P. Cocks.* The absence of the bright yellow dots that were found on the mouth of the latter, and the entire want of visible suckers, induced me to consider mine as undescribed. It is true, the repeated occurrence since of specimens with a disk more or less yellow nullifies the force of the former objection, but the latter remains; and until I see specimens of *A. alba* from Mr. Cocks's locality, I dare not assume the identity. From original drawings with which that gentleman has kindly favoured me, I perceive, moreover, that the tentacles in *alba* are numerous and slender, whereas in *sphyrodeta* they are few, thick, and conical. Besides this, the marking of the tentacles in *alba*, which are described as "barred, having opaque white patches anteriorly," removes the animal from any species with which I am acquainted. I am not, however, without hope, that before this work is closed, the kindness of my Cornish friends may bring me into personal acquaintance with this, and other desiderata of that prolific coast.

The substitution of another appellation for that which I had at first assigned to this species was called for on two accounts. First, there was already a species named *candida* by Müller; of which fact I was not aware. Secondly, this name proved objectionable. While no specific name may be rejected on account of its having *no* significance, every one ought to be rejected which has a *false* significance. Mr. Holdsworth's discoveries of the species at Dartmouth and in the Channel Islands have proved, or at least rendered it highly probable, that the normal condition is to have the disk of a yellow hue, more or less deep, the white variety being nothing more than the albinism to which organic colours so often tend. The term "*candida*," therefore, became inappropriate as a *nomen triviale;* and I have sought one which should express a more unvarying character. The word "*sphyrodeta*" signifies *sandalled*, from *σφῦρα*, the ankles, and *δέω*, to bind; and alludes, as I need scarcely say, to the line which, like a narrow ribbon, encircles the tentacle-foot.

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* Johnst. Br. Zooph.; Ed. 2; 217. Rep. Cornw. Polyt. Soc. 1851; 6.

That the white disk marks a degenerated condition is rendered more probable by some facts that have come under Mr. Holdsworth's observation, and, in part, also under my own. A specimen obtained by that gentleman at Dartmouth was at first of a rich chrome-yellow over the whole disk; but after having been some time in captivity, it gradually faded to a sort of dull cream-white; in this condition, my friend submitted it to my care for a few days, during which time it quickly resumed its brilliant face. Another individual, which I think Mr. Holdsworth brought from Guernsey, fell into a like condition. Writing of this, he observes, "The animal has been out of sorts, and I have been obliged to administer to it several *draughts* (of pure sea-water), which have nearly set it to rights again. The beautiful colour of the disk, however, has nearly vanished, but some traces of it are still to be seen around the mouth. When I first had it, the colour was very conspicuous."

The Sandalled Anemone is an interesting little captive. It expands its flower-face with great readiness; rarely remaining long closed, provided the surrounding water be pure. The large conical tentacles stretch out horizontally to their utmost, like a star; and though, on being touched, it will partially contract, it unfolds the instant the annoyance ceases, and is presently full-blown again. It is fond of floating at the surface of its prison, the base dilated at the top of the water, like a swimming Nudibranch, the body hanging downwards, with the tentacles widely expanded.

It cannot be considered a common species; but where it does occur, it is usually in some numbers. It is easily obtained when discovered, as it does not inhabit holes or crevices, but adheres to the smooth rock; it does not appear to indue its body with gravel, or any extraneous substances. Mr. Holdsworth found it not uncommon at Guernsey, with the unexpected habit of lodging under stones on the beach, at low water. At Dartmouth the same observer records its occurrence on the roots of *Laminaria*, as well as on the rocks.

In my original notice of the species, I have mentioned the readiness and profusion with which the *acontia* or armed filaments are shot forth from the body on the slightest provocation. Subsequent observation has abundantly confirmed this irritable habit. The character and armature of the *cnidæ* are also there noted.

The localities of the species are as yet but few, though they are widely scattered.

Jersey, Guernsey, *E. W. H. H.:* Dartmouth, *E. W. H. H.:* Ilfracombe, *P. H. G.:* Hilbre Island, *E. L. W.*

nivea.
SPHYRODETA.
pallida.

THE PALLID ANEMONE.

Sagartia pallida.

PLATE III. *Figs.* 4, 5.

Specific Character. Tentacles numerous, slender, white, each rising between two bowed blue lines.

Actinia pallida. HOLDSWORTH, Proc. Zool. Soc. 1856, pl. v. fig. 4.
Sagartia pallida. GOSSE, Annals N. H. Ser. 3. vol. i. p. 415.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; considerably wider than column; outline undulate.

Column. Smooth, without conspicuous suckers. Substance pulpy. Form cylindrical, pillar-like, about twice as high as wide, when extended, but very flat when contracted. Margin a low parapet.

Disk. Flat or slightly concave; the margin entire.

Tentacles. Numerous, arranged in four rows; moderately long, slender, and slightly tapering to the tips, their length regularly diminishing from the first row outwards. They are commonly carried sub-erect, the external rows arching outwards.

Mouth. ——?

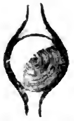
Acontia. Emitted from the mouth in some abundance, but not very readily.

COLOUR.

Column. Pellucid whitish. White longitudinal lines are sometimes visible, but they are merely the edges of the septa, seen through the translucent skin, and not bands of surface-colour.

Disk. Pellucid whitish.

Tentacles. Pellucid whitish. The foot of each tentacle is embraced by two curved lines of dark blue, which approach each other without meeting; and pass off in front towards the centre of the disk, and behind towards the margin, in the form represented in the accompanying figure. The general effect is to produce a bluish shade on that region of the disk from which the tentacles spring.



TENTACLE OF PALLIDA (*viewed vertically*).

SIZE.

Diameter of column about one-third of an inch; height of column two-thirds; expanse of flower nearly an inch.

LOCALITY.

South-west coast of England; rocks between tide-marks.

VARIETIES.

α. *Cana.* The colourless state above described. Plate iii. fig. 5.
β. *Rufa.* Column of a dull brownish-orange, paler or deeper in tint. Plate iii. fig. 4.

I am indebted for my knowledge of this little form to Mr. Holdsworth, who discovered about a dozen specimens scattered about the rocks near the entrance to Dartmouth Harbour, "a part of our western coast, which, from its steep rugged character, and its luxuriant growth of sea-weeds, presents a fruitful hunting-ground for those in search of marine productions." They were obtained in July, 1855, and were described by their discoverer, in a Memoir read before the Zoological Society of London in the following December, and subsequently published in their Proceedings. All of the individuals were of the variety *cana*, differing in no respect among themselves except in size. "They were found on the exposed surface of perpendicular rocks at about half-tide mark; and when out of the water and contracted, were very difficult to distinguish, owing to their great transparency." *

Some time afterwards the same gentleman obtained several specimens of a little Anemone which agreed with his former captives in every respect, save that their column was of a rufous hue; the tentacles, however, having the same characteristic foot-marks as before. He concluded that they were but varying phases of the same species; and, as he kindly gave me an opportunity of forming a judgment by presenting me with a specimen of each colour, I concur with him in this opinion, and have accordingly so represented them.

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* Proc. Zool. Soc. 1855.

Some of my friend's observations on this minute species,—made in the course of a correspondence concerning its claim to be so considered,—will be read with interest. "*Pallida* is certainly not *candida* [= *sphyrodeta*]. I have now seen, and know both well, and can readily point out the distinctions. *Pallida* may be easily taken for a young *dianthus* at first sight, having a smooth skin, with a rather erect body, and long pellucid filiform tentacles. . . . . The basal rings on [? around] the arms of *pallida* are even narrower than in *candida*, and have no direct communication with the edge of the disk; nor is there any appearance of a spot; their colour is almost black, but with a purplish tinge. The disk is quite transparent. The original specimens were almost colourless, but later captures were of a reddish buff, like some of *dianthus;* and one of these, not more than half an inch in expanse, produced about a dozen young ones, about an eighth of an inch in height,—slender little things, with tentacles almost erect. They resembled their parent in form and colour, as far as could be seen in such minute creatures. There was no other Actinia besides the red *pallida* in the glass at the time, and the young ones adhered to the side of the glass vase, immediately surrounding the larger specimen, so that I had no doubt of their origin. . . . . I have more than once suspected that *pallida* was merely the young of *dianthus:* but surely the latter would not breed when only half an inch high." I may add that the characteristic lines of blue, though minute, are a sufficient distinction of the species.

In my limited opportunities of investigating this Anemone, I found it impatient of light, and sufficiently locomotive. A specimen, adhering to the upper surface of a flat stone, I put into a tea-saucer; it immediately crawled to the edge of its stone, glided round, and passed under, till it was quite out of sight: it thus traversed about thrice its own length in a quarter of an hour. I then turned up the stone, and the animal presently crawled off to the bottom of the saucer: closed all the time, except that the tips of its tentacles were protruding.

Its manner of crawling was somewhat curious. It gradually distended a portion of its body, which then was swollen, and quite pellucid, having a strange appearance, owing to the white china shining through the tissues of the distended portion. Then this part, being raised from the bottom so as to be loose, was pushed out and took a fresh hold, and the other half was rapidly pulled up to it, when the anterior half began again to distend instantly, and proceeded as before. The progress could be easily watched with a lens, over the minute specks of the bottom. It was impossible to witness the methodical regularity of the process, and the fitness of the mode for attaining the end, without being assured of the existence of both consciousness and will in this low animal form. At night I found it had marched about three inches, or twenty-four times its own diameter, in six hours: but its progress, while I watched it, was much more rapid than this.

The only recognised habitat for *Sagartia pallida* is—Dartmouth, *E. W. H. H.*

sphyrodeta.
PALLIDA.
dianthus.

THE TRANSLUCENT ANEMONE.

Sagartia pura.

PLATE III. *Fig.* 6.

Specific Character.	Wholly pellucid-white, without markings.
Actinia pellucida.	ALDER, Catalogue of Zooph. of Northumb. and Durh., 43.
Sagartia pellucida.	GOSSE, Annals N. H. Ser. 3, vol. i. p. 415.
pura.	ALDER, in litt.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to shells from deep water: somewhat exceeding the column.

Column. Perfectly smooth, without visible suckers. Substance pulpy. Form cylindrical, a little higher than wide, when extended, but nearly flat when contracted.

Disk. Slightly concave; the margin entire.

Tentacles. Thirty or upwards, arranged in about three rows; the inner ones longest (about twice the diameter of the disk in length); diminishing regularly outwards, the outermost row being rather short. The inner ones are usually carried more or less erect, the outer arching downwards.

Mouth. Set on a small cone.

COLOUR.

The animal is wholly without positive colour, except that the tentacles have sometimes a slight tendency to become sub-opaque at each extremity, when they assume a white appearance in these parts. Occasionally a few white lines occur on the column; but these appear to be merely the edges of the septa, seen through the transparent integuments.

SIZE.

About a quarter of an inch in height, and one-sixth in diameter of column; expanse nearly half an inch.

LOCALITY.

The coast of Northumberland. On old shells from deep-water.

This species I know only by the descriptions and figures of Mr. Joshua Alder, who has kindly put into my hands, not only the published "Catalogue of the Zoophytes of Northumberland and Durham," in which it first received a name and place among our Anemones, but additional notes in MS., and several original drawings. All these I have used in my diagnosis and figure. The name "*pellucida*," originally applied to this little animal, having been preoccupied, Mr. Alder proposes that it should be called "*pura*."

Little is known of its history. Its discoverer observes of it,—"It has occurred to me two or three times at Cullercoats, on old shells,—crusted shells of *Fusus antiquus* from deep water,—nestling among the Serpulæ and Barnacles with which they were covered. It is so inconspicuous, when contracted, as to elude observation; and it was not till the shells had been some time in sea-water, and the Actinia became expanded, that its presence was detected. A specimen kept in a vase was very restless, shifting its place continually, and often changing form."

It seems to be somewhat rare. Mr. Alder has seen but three specimens. Mr. R. Howse has obtained it once or twice from the five-men boats, on the same coast. His specimens were slightly larger than Mr. Alder's.

sphyrodeta.
PURA.
pellucida.

THE EYED ANEMONE.

Sagartia coccinea.

PLATE V. *fig.* 4: XII. *fig.* 4 (*magnified*).

Specific Character. Body rufous, with white lines; tentacles pellucid, ringed with white, marked at the foot with a black bar, and two triangular black spots below it.

Actinia coccinea.	MÜLLER, Zool. Dan. Prod.; 231, No. 2792. Zool. Dan. ii. 30; pl. lxiii. figs. 1—3. JOHNSTON, Brit. Zooph. 2d Ed. p. 215.
Sagartia coccinea.	GOSSE, Annals N. H. Ser. 3. vol. i. p. 416.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to shells, in deep water: little exceeding the column. Outline irregularly cut and lobed.

Column. Smooth, without visible suckers. Substance pulpy. Form cylindrical; the height, when extended, twice the diameter; the margin tentaculate.

Disk. Flat; the margin entire. Outline circular, scarcely exceeding the diameter of column. Radii distinct, smooth.

Tentacles. About sixty-four (in my largest specimen), arranged in three indistinct rows, of which the first and second contain each sixteen—the third, which is marginal, thirty-two. The inner rows are the largest, some of the outermost being minute points. Compared with the average of Anemones, they are short and thick, obtusely conical, and stand nearly erect.

Mouth. Not raised on a cone. No distinct lip.

Acontia. Protruded freely, both from column and mouth.

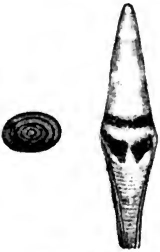
COLOUR.

Column. Light brownish orange, marked with many white or whitish longitudinal streaks from margin to base, more numerous below. These streaks are of varying width, but are in general equal or superior to the intermediate red spaces; their edges are irregularly jagged. They are not formed by the edges of the septa, nor always correspondent with them.

Disk. Light red. Each radius bears two white lines,—one parallel and close to each edge, but separated from its neighbour by a fine line of the ground colour: this gives an appearance as if every radius were divided from its fellow by a pair of white lines. Among the tentacles the colour of the disk becomes a rich and brilliant orange, which colour extends in short lines between the tentacles over the edge of the margin.

Tentacles. Pellucid, colourless, with four broad rings of opaque white, and a white tip: the rings are obsolete on the hinder face. At the foot of the front, a band of dark brown divides the two lower white rings, the lowest of which is succeeded by two triangular clouds of dark brown.

Mouth. The radial lines end suddenly at the edge of the mouth, which is sharp and abrupt. The upper part of the throat is orange, but presently becomes a deep red-brown.



TENTACLE
(*viewed endwise and frontwise*).

Size.

The largest I have seen is half an inch in height, by about one-third of an inch in diameter when expanded.

Locality.

The north-west coasts of Europe. Laminarian and coralline zones.

I owe my acquaintance with this attractive little species to the kindness of Mr. Charles W. Peach, who forwarded to me, in April of the present year, four or five living specimens attached to an old pecten-valve from deep water off the Caithness coast. The same gentleman has since favoured me with sketches of manifestly the same species, which he made from the life, during his residence in Cornwall. It was first described by Müller, in 1777, and figured in his magnificent work on the animals of Denmark. Dr. Johnston included it in his second edition of "British Zoophytes," on the authority of Edward Forbes, who found it on the coast of Ireland, "on rocks and sea-weeds;" but added no other information to the description of Müller, which he quoted in the original Latin. An expression in this, which had puzzled me not a little, became graphically descriptive when I saw the living animal. Müller says that the tentacles "seem composed of an eye furnished with exceedingly slender rings crowded together,"—a comparison which at first seems little applicable to such organs. But, in fact, they are frequently contracted into very low cones or warts; when, viewed from above, they present the appearance of a number of fine rings surrounding the central point, very much like the eye-spots in a butterfly's wing. (See left-hand figure above.)

The colony in my possession consists of one of the size and character that I have described above, and several minute ones around it, none of them so large as a small pea. Since I have had them, two or three more have been produced from the largest, from the size of a grain of sand to that of a poppy-seed. I believe all of these are the result of a spontaneous separation of fragments from the base, and not of a generative process. The most minute displays its circle of tiny tentacles.

The outline of the base is exceedingly variable: it projects in ragged promontories and rounded points, which continually, though slowly, change their form and relative proportions. From some of these, minute fragments separate, which soon become independent animals. It is possible that the *Actinia lacerata* of Sir J. Dalyell may be this species; but I rather incline to identify it with our *viduata*. The sinuous outline on which he relied rather indicates a condition than a species.

Though the short conical form of the tentacles is characteristic, yet occasionally they assume a lengthened slender shape, their markings becoming evanescent. Müller describes the animal as "changing place by the aid of its tentacles;" I find it rather given to wandering, but not in this manner, which I have never seen an Actinia use (his phrase "*uti congeneres*" notwithstanding), but by the extension and contraction of the base.

Ireland, *E. F.:* Caithness, *C. W. P.:* Cornwall, *C. W. P.*

miniata.
venusta.
COCCINEA.
viduata.

THE CAVE-DWELLING ANEMONE.

Sagartia troglodytes.

Plate I. *fig.* 3 : II. *fig.* 5 : III. *figs.* 1, 2 : V. *fig.* 5.

Specific Character. Tentacles barred transversely; marked at their foot with a black character resembling the Roman letter B.

Actinia viduata.	Johnston, Mag. Nat. Hist. viii. 82. fig. 13. E. Forbes, Ann. Nat. Hist. iii. 48. Couch, Corn. Fauna; iii. 75 (nec Müller).
mesembryanthemum, var. β.	Johnston, Brit. Zooph. Ed. i. 211.
troglodytes.	Johnston (after Price), Brit. Zooph. Ed. 2. 216. fig. 47. Cocks, Rep. Cornw. Polyt. Soc. 1851. 6. pl. i. fig. 16.
? elegans.	Dalyell, Anim. of Scotl. 226; pl. xlvii. fig. 9.
? explorator.	Ibid. Ibid. 227; pl. xlvi. fig. 11.
Sagartia troglodytes.	Gosse, Linn. Trans. xxi. 274 : Tenby, 365 : Manual Mar. Zool. i. 28 : Annals, N. H. Ser. 3. i. 416.
aurora.	Ibid. Ann. N. H. Ser. 2. xiv. 280 : Tenby, 356 (Frontispiece).
Scolanthus sphæroides.	Holdsworth, Proc. Zool. Soc. 1855. pl. v. figs. 1—3.

GENERAL DESCRIPTION.

Form.

Base. Adherent to holes in rocks, frequently detached: somewhat exceeding the column.

Column. Smooth towards the base, but beset on the upper two-thirds with suckers, which have a strong power of adhesion. Substance firmly fleshy. Form cylindrical and much lengthened, in full extension, the height many times exceeding the diameter. Margin tentaculate.

Disk. Flat or slightly concave: the margin rarely undulate. Outline circular. Radii strongly marked, and crossed by close-set transverse striæ.

Tentacles. Numerous (amounting to two hundred or upwards in some specimens), arranged in four or five rows; the first row largest, and decreasing gradually to the outermost; in extension about as long as the width of the disk, conical, bluntly pointed. The manner in which they are carried varies in the different varieties.

Mouth. Generally elevated on a cone.

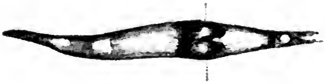
Acontia. Long and very slender. Emitted reluctantly, and only on great irritation.

COLOUR.

Column. Olive, of a greener or browner tint in different specimens, marked with pale longitudinal stripes, widest and most conspicuous at the base, where the longer alternate with shorter ones, all generally vanishing towards the summit. The suckers for the most part pale.

Disk. Varied with black, white, and grey, in a delicately pencilled pattern, that has justly been compared to the mottling of a snipe's feather. The pattern, which is pretty constant, is produced by the following elements:—each primary radius is greyish-white from the B-mark of the tentacle-foot, about half-way to the mouth; then there is a patch of black inclosing a spot of white (often very bright), and then a narrow line of pale yellow or drab, edged with black, brings the radius to the lip. The secondary radii have the same pattern, but more attenuated.

Tentacles. Pellucid grey, crossed by three (or four) broad rings of pellucid white, of which the lowest is undefined, and is frequently tinged with buff or orange. At the foot of each tentacle is a black mark consisting of a thick transverse bar, succeeded by two curves, the whole bearing the form of the Roman capital letter B. This mark is very constant and characteristic; sometimes, though the form is preserved, the outline is wholly filled up with black; and sometimes, but very rarely, the whole is nearly or even quite obliterated.



TENTACLE OF S. TROGLODYTES
(*front*).

Mouth. Generally whitish.

SIZE.

Large specimens attain a diameter of an inch in the column, and two inches in expanse of flower: the height is sometimes two inches and a half, but more commonly it does not exceed an inch.*

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* Mr. Holdsworth, in one of his letters, has drawn a pen-and-ink sketch of one which was protruding to a height of two inches from the sand at the bottom of his tank; and states that, as the sand was full two inches thick, and that, to his belief, the *troglodytes* was attached,—it must have been four inches long.

LOCALITY.

The coasts of England and Scotland. Hollows in rocks between tide-marks.

VARIETIES.

* With characteristic marks on disk and tentacles.

α. *Scolopacina.* The condition above described. (Tenby: Torquay.) Plate II. *fig.* 5.

β. *Hypoxantha.* Disk and tentacles pinkish drab: the latter strongly barred, with the B indistinct; each tentacle full orange. (F. H. West in litt.)

γ. *Badifrons.* Disk ground-colour pale umber-brown: tentacles wholly pellucid grey. (F. H. West in litt.)

δ. *Albicornis* Disk, ground-colour French-grey; tentacles wholly opaque white. (F. H. W. in litt.)

** With characteristic marks on tentacles only.

ε. *Nigrifrons.* Column greenish drab, duskier towards the summit. Disk uniform blackish-grey; summits of mouth-angles orange-cream-colour. Tentacles pellucid, for the most part marked with an undefined long patch of opaque orange-cream-colour on the lowest third of the front; above this three remote spots of opaque white on the front face. The B distinct when searched for, but nearly merged in the dark hue of the disk. (Morecambe Bay.)

ζ. *Fulvicornis.* Column drab, blackish at the summit. Disk dull umber; each radius with an undefined centre of black in the exterior half; the interior third wholly drab, separated by black lines. Lip narrow, orange. Tentacles short, remarkably blunt; numerous, in five rows; uniform opaque pale orange; the B strong, and distinct. Between the bases of the tentacles black radial lines are continued on a fawn ground, which becomes orange marginally, with a pretty effect. (Morecambe Bay.)

η. *Pallidicornis.* Column dull grey, blackish above, becoming dull rusty immediately at the summit. Disk dull sepia-brown; the radii separated by slender black lines: primary radii with a central white spot broadly margined with black. Tentacles short, very blunt, set in five full rows; opaque dull cream-white, the front with a line of faint orange, and a broad ill-defined stripe of blackish down each side; each tipped with a round dark spot. The B separated into its constituent halves, by a dividing line of whitish. (Morecambe Bay.) Plate I. *fig.* 3.

θ. *Aurora.* Agrees with α in column and disk, and in the form and comparative fewness of the tentacles; but the colour of these organs is brilliant orange, with the B rather ill-defined. (Tenby: Torquay.) Plate III. *figs.* 1, 2.

ι. *Rubicunda.* Agrees with *α* in disk and tentacles (nearly); but ground-colour of tentacles rose-red: column dull buff. (Torquay.)

κ. *Lilacina.* Column greyish-drab with faint longitudinal bands of darker. Disk buff, the radii separated by delicate black lines. Tentacles an exquisite light lilac,[*] with a white cloud at the lower part, succeeded by a strongly-defined black B. (Boulogne.)

λ. *Melanoleuca.* Column greenish drab. Disk whitish, becoming orange on the central region. Tentacles divided into well-defined alternate groups of semi-pellucid white and bluish black; about five groups of each colour, but not quite regular in extent: those of each hue are conspicuously ringed with a darker tint, and have the B thick and strongly marked. (Morecambe Bay; Boulogne.) Plate V. *fig. 5.*

μ. *Prasina.* Disk and tentacles transparent crown-glass-green; primary radii with a white spot, secondary with a white line. Lip white. (Firth of Forth? Dr. T. S. Wright in litt.)

⁂ Without characteristic marks on disk or tentacles.
(Column drab.)

ν. *Flavicoma.* Disk grey-buff, more positive on the lip; tentacles warm orange-buff; remarkably short, blunt, and stiffly set. (Boulogne.)

ξ. *Auricoma.* Disk pale orange, with an undefined dash of white on some of the radii. Tentacles long, slender, pellucid rich orange. (Morecambe Bay.)

ο. *Luna.* Disk warm orange, with the central fourth white. Tentacles elongated, opaque white, with an unbroken line of pellucid white running down each side. (Boulogne. F. H. W. in litt.)

π. *Nox.* Disk and tentacles black: the latter much attenuated, with an unbroken line of grey running down each side. (Boulogne. F. H. W. in litt.)

ρ. *Eclipsis.* Disk black. Tentacles opaque brilliant orange. (Morecambe Bay. F. H. W. in litt.)

σ. *Nycthamera.* As *ρ* in every respect, except that the black of the disk ends abruptly at half-radius, the central portion being light grey. (Morecambe Bay. F. H. W. in litt.)

τ. *Hesperus.* Wholly pure white; gradually acquiring colour in a confinement of some months. (Lundy. W. Brodrick in litt.)

υ. *Nobilis.* Disk deep violet-blue. Tentacles rich orange. (Cheshire Coast. Lady Cust in litt.)

From the above list it will be readily perceived that there is no species of our native Anemones that approaches this in Protean variability. And yet there is, in general, no difficulty in determining the species; the characteristic **B** is an excellent note of distinction wherever it is present; and in those varieties in which it is obliterated in the evanescence of the markings, as in vars. μ, ν, ξ, ο, or merged in the abnormal spread of the dark hue of the disk, as in vars. π, ρ, σ, υ, the true character of the specimen will be betrayed by the form and substance of the body, the drab colouring of the column, or the tendency of the tentacles to assume the orange hue.*

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[*] I describe it as I see it; but Mr. West, to whose liberality I am indebted for this, as for so many specimens of this species, informs me that it is now in a deteriorated condition. Originally it was a very rich full lake or dark lilac.

It is one of our most generally distributed species, ranging apparently all round our coasts, from east to west, and from north to south. It is also tolerably abundant, at least in many of its localities, though less liable than some to be seen by casual observers, from its habits of retirement. Mr. Price well characterised it, when he proposed for it the name of *troglodytes* ("cave-dweller," from τρώγλη, a cavern, and δύνω, to enter); for its favourite habit is to ensconce itself in holes and crevices of the solid rock, into which it retreats on alarm. In the shallow pools that floor the largest of the caves at St. Catherine's, Tenby, the vars. *scolopacina* and *aurora* are abundant, especially the former, spreading their pretty blossom-faces at the bottom of the clear water. And yet it is not easy to discover them even when scores are thus exposed; for the mottled colouring of the disk and tentacles is so like that of the sand and mud of the pools, that even a practised eye may overlook them without the closest searching. They often protrude the tentacles only, clustered perpendicularly, through the mud, and sometimes only the tips of these organs. Their concealment is aided by the fragments of sand, gravel, and broken shells, that adhere to the suckers of the column; these foreign bodies are often present in considerable quantity, and are pertinaciously retained for a long time, even in captivity.

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* "In addition to these characteristics, I think the stout firm texture of the base a fair mark, as it is not so readily injured as in most species. Also the comparatively slight adhesion, at least when you can get fairly down to it: I think it generally yields to careful fingering." (F. H. W. in litt.)

Its general resort is not very low; from ebb neap-tide downward may be considered its range: but the var. *aurora* affects a much higher level, habitually dwelling near high-water mark, but then it is invariably in some little hollow of the rock in which the water stands.

Several of the varieties have been found at Morecambe Bay, by my friend Mr. F. H. West. He describes the locality as "a low, flat, sandy shore, remarkably dreary and uninviting for the sea-coast, and without so much as a rock in sight. The tide goes out a considerable distance; perhaps three-quarters of a mile, or even more, laying bare an almost unbroken expanse of what is rather mud than sand, very soft and tenacious. Towards the south side of the Bay is a spit of firmer ground where a few stones are uncovered, which can hardly be dignified with the name of boulders, since any of them may be turned over without assistance. Attached to these we find *A. dianthus*, both the pure white and orange varieties, mostly young. In the course of an hour we found numerous specimens of these, several varieties of *troglodytes*, some rather pretty pied sorts of *crassicornis*, and of course the common *mesembryanthemum*. Several kinds of *Eolis*, as *coronata*, *papillosa*, *Drummondi*, and *pellucida*, are found here:—*Sabellæ* in abundance; and *Sertulariæ*, various. There are no rock-pools; but in the sandy hollows are Gobies, Blennies, Fifteen-spined Sticklebacks, and Pipefishes; not to mention young Congers, that flop and flounder about when disturbed with most unpleasant energy. . . . All the *troglodytes*, including the orange-disked, present themselves through the sand, much elongated,—the point of attachment being sometimes three or four inches below the surface. They are all equally sensitive, shrinking on the slightest alarm."

Mr. Holdsworth found the species under circumstances which deceived him into the belief that it was a permanently free form, and he accordingly named it *Scolanthus sphæroïdes*.* "The specimens were found near low-water mark, imbedded in the fine chalky mud which fills the crevices of the rocks at Seaford, their expanded disks being just level with the surface, but so nearly covered that only a faint star-like outline was visible; on being touched they instantly disappeared; and so great was their power of inversion and contraction, that on digging carefully, they were generally found about one-and-a-half inch deep, and having that peculiar bead-like form which has suggested the specific name of *sphæroïdes*. There was usually a depth of six or seven inches of mud below them; so that they could not have been fastened to the rock; and since I have had them at home, now nearly five weeks, they have not shown the least inclination to attach themselves to the gravel, or glass sides of the tank in which they are living; three of them have burrowed into some sand on which they were placed, but the others remain on the surface and are but rarely contracted. Soft mud is probably their natural habitat, being the most easily penetrated; and I could find no traces of any of these animals in a considerable tract of sand only a few yards from the locality whence these were obtained."

My friend was subsequently convinced that he had been misled by the appearance of the specimens: he examined them with me, and kindly gave me one of his original specimens, and we were both convinced that they were of this species. The apparent perforation at the rounded posterior extremity could have been nothing more than the contraction and approximation of the column around the retracted base; and we proved its power of basal adhesion in the specimen which came into my possession; for it not only attached itself by the entire broad base to the saucer—and that repeatedly after having been removed—but during the night marched several inches to seek shelter under a shell. What had appeared to be an epidermis was nothing but a ring of exuviated mucus, which was readily removed, bringing away all the dirt, and leaving a clean smooth *Sagartia*. The tentacle-feet displayed the **B**-mark, and there seemed little to distinguish it from the normal colouring, except the dingy drab hue of the column.

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* Proc. Zool. Soc.; May, 1855.

A specimen of the var. *fulvicornis*, in my possession, when disturbed, assumed a globular form, with the base contracted to one-sixth of an inch in diameter, and became very buoyant. It thus strongly reminded me of Mr. Holdsworth's *sphæroïdes*.

It seems the habit of the species to be very free; and this tendency more especially marks the mud-loving kinds with a pale drab exterior. It is a common thing for one of these to lie for weeks in a tank rolling loosely about the bottom, alternately contracting and stretching its column, and folding or expanding its tentacles at pleasure, apparently quite healthy, and yet showing no inclination to choose a settled residence. I have had many examples with this habit, which, by and by, having sown their wild oats, suddenly fix themselves, give up their vagrant ways, and become sober housekeepers. Mr. Holdsworth writes me of one which, after six months' captivity, "has not yet attached itself, but wanders about, like a restless spirit without a home."

The suckers are in this species very adhesive; and in this vagabond condition it is not rare for the Anemone to moor itself temporarily, not by the base, but by these organs; sometimes by a few of the most anterior ones, when the base is thrown up at an angle, in a somewhat undignified fashion. Occasionally I have seen a specimen which had attached itself thus to a stone, or the side of a vessel, and had, by its own weight or other cause, removed a little from its attachment,—still fastened by two or three suckers, which were unnaturally stretched out to a length of the sixth of an inch, and a proportionate tenuity, resembling the suckers of a *Holothuria.*

Some observed facts indicate a considerable tenacity of life in this species. On the 5th of October last Mr. West inclosed in a small tin canister three specimens with a little damp weed, but without water. The box was then addressed to me, and committed on the same day to the post-office at Leeds; where, however, owing to the oozing forth of a slight wetness, it was detained. In the course of a few days I informed him that it had not arrived; but my friend residing out of the town, and my letter arriving on Saturday evening, he was not able to obtain from the over-scrupulous postmaster the suspicious missive, until Monday morning, the 12th—*a week* (within five hours) *of the animals' imprisonment.* Of course he expected to find them in a pretty advanced state of decomposition; but, on removing the lid, saw at once that the case was not hopeless. They were immediately treated to the long-foregone luxury of a bath of sea-water; and though one of them was *hors de combat*, the other two recovered, and lived to bear the journey to Devonshire under better auspices.

To the same kind friend I owe the possession of the lovely var. *lilacina*, and the following playful note of its endurings:—"It is one of the French consignment, and has led almost a charmed life. Soon after my letter to you [dated Jan. 27], written after their arrival, I fancied the water in one of the vases was becoming foul, and therefore removed all the animals save one—the most valuable,—which could not be found, and which I concluded was the source of the mischief. The vase stood, however, in an empty room till last Tuesday [April 20],—so you may guess the strength of the pickle,—when I emptied out the whole kettle of fish, and found Monsieur at the bottom. He is only the shadow of himself, and looks uncommonly seedy; but is a character, nevertheless."

While writing this article, I have had an opportunity, for the first time, of seeing the discharge of true ova from an Anemone. In a saucer, containing a *Corynactis* and some varieties of *troglodytes*, that was standing on my library table, I found, on the morning of the 28th of April, that there had been deposited during the night an even layer of pale brown substance on the bottom, so placed as to make it uncertain whether it had proceeded from the *Corynactis* or from one of the *troglodytes*. The mass was about as large as a fourpenny-piece. A little taken up with a pipette, and examined under a power of 500 diam., proved to be composed of ova, opaque, perfectly globular, varying from .0043 to .0051 inch (but the former was an unusually small one): they were mostly very uniform in size, viz. .0050 inch. They had a clear well-defined edge, and not the slightest appearance of cilia.

I removed the *troglodytes* to a clean part of the saucer (it was the beautiful orange var. *auricoma*), and after a few hours perceived that it was discharging more ova, which were streaming over its lower tentacles, as it lay on its side, but fully expanded. I therefore immediately transferred it to a straight-sided glass box for closer examination.

As soon as it had expanded again after the shock of removal, which it did in a few minutes, I began to watch it. It was lying on its side, with its disk and expanded tentacles near the glass side, and facing my eye. Many of the tentacles, especially those which were on the inferior side, were occupied with more or fewer ova, some having fifty or more, others half-a-dozen, others one or two. In each case they were rolling up the interior of the tentacle from the general cavity, and coursing to and fro under the influence of the lining cilia, sometimes accumulating temporarily at the tip, but never, so far as I saw, discharged there.

On looking at the mouth, I perceived that the gonidial tubercles of one angle were brought into contact with those of the opposite angle, dividing the mouth into three temporary orifices, two lateral and one central. The lateral orifices, however, were at right angles to the ordinary line of extension. Through each of these lateral orifices ova were issuing, somewhat slowly, with an even motion evidently ciliary, for the most part not in contact with the sides of the tube, but coming up through its dark centre. As each came into view, and deliberately rolled over the edge of the orifice, it streamed across the disk, and over the face of the expanded tentacles, carried clear of all by means of the ciliary currents of these parts. The ova closely followed each other, generally in single file; but occasionally two, or even three, were slightly agglutinated together. Perhaps on an average about three or four in a minute issued, but with many lengthened interruptions of the continuity.

The process of egg-discharge did not continue long after I began to watch it; though the accumulations remained in the tentacles. The next morning, those that had been deposited were for the most part disintegrated, resolving into an undefined mass of minute cells. A few only here and there retained their outline. During the next day or two, especially in the night, a few more were discharged, which were a little larger than the former, averaging .0060 inch. No result, however, followed the discharge, and they soon decomposed.

Dr. Byerly, however, has succeeded in rearing the young of this species; but from ciliated germs, not from ova. Some specimens which he found numerous on the Leasowe shore of the Mersey, threw off many germs, which could be plainly seen through the skin at the base. These made their exit through "breaches of continuity in the outer envelope near its junction with the basal disk, and sometimes through ragged apertures in the base itself." The germs were about as large as a pin's head, perfectly globular, and had a very sluggish motion. Three or four were put into a wide-mouthed bottle and stopped: after two months, one had developed a perfect Actinia, the tentacles being fully expanded. At the time of the record it had lived six months; but having never been fed, it had not visibly grown.*

Since the former observations were made, I have proved this species (contrary to what has been asserted of the Actinoids) to be hermaphrodite. The variety in this case was the exquisite one I have named *melanoleuca* (see Pl. V. fig. 5), a large specimen received about a week before from Morecambe.

On the 26th of May, this individual, on being put into fresh sea-water, instantly made it turbid. I took it out in the course of the day, and isolated it in a small glass tank of clear water. Presently this also became quite turbid, as if milk had been mixed with it, while clouds of the white fluid were seen floating about the animal. On the vessel being shaken, and again on my touching the Anemone, it contracted; and, on each occasion, a stream of white fluid, almost as opaque as milk, shot up from the mouth, and slowly diffused itself in the surrounding water.

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* Edin. New Phil. Journ.; Jan. 1855.

With a pipette I took up a drop from one of the diffusing clouds, and submitted it to the microscope. It was filled with millions of excessively minute, but vigorously motile atoms, clear and colourless, having an ovate body, and a slender tail, which wriggled their little tails, and rapidly oscillated from side to side, from the tail-tip as a *point d'appui*. This was the first time I had ever seen the *spermatozoa* (for such they assuredly were) of the Anemones.

The next morning, the water still continuing turbid, I was about to pour it away, when I saw beneath the spot where the Anemone had lain, a thick layer of cream-coloured soft substance, well-defined in its outline. I took up a little of this and examined it. It proved to be a mass of ova. They agreed with those above described, being mostly quite globular (though a few were distorted); the majority closely alike in size, viz. ,0058 inch; but a few were manifestly smaller, and measured from .0046 to .0048 inch. They were perfectly defined, with a distinct clear wall, and olive granular contents.

When crushed with a graduated pressure to rupture, the whole contents of each ovum were seen to consist of a vitelline mass of minute oil-particles in an albuminous fluid, inclosed in a very thin vitelline membrane. In a few instances I detected the germinal vesicle with its germinal spot, sometimes by its clearness when the ovum was flattened, sometimes by its escape as a clear bladder from the ruptured membrane: but in many examples I could not find it at all.

I removed the Anemone from the vase, leaving the ova alone, in hope that they would develop, but they all decomposed.

I may add, that since then I have seen the like discharge of *spermatozoa* from a specimen of *viduata.*

I refer with hesitation the *Actinia elegans* and *A. explorator* of Sir John Dalyell to this species. The former he describes as of a reddish-brown or orange hue, with white (suctorial) spots, and well-barred tentacles; the disk generally crossed with a white line. The latter has more of the ordinary aspect of a *troglodytes*.

Sir John Dalyell observed in the latter (which he named *explorator* from the circumstance) the occasional elongation of one or two tentacles, which we have seen to be a not uncommon phenomenon in this family. A specimen, not half an inch in diameter, exhibited two tentacles together, each of the length of an inch and three quarters. In general, the elongation took place at night. From its ordinary length of half an inch, each tentacle gradually became two inches long, thickened and distended to transparency. "It is then seen rising from among the rest, curving over to the opposite side of the disk, and as if searching around." After a while, it shrank back to its former state.

Both of these (supposed) species were prolific. The latter produced sixty young in one night; which were pure white, and large in proportion. Of the former, three individuals, in October, produced infusorium-like germs, which were ovoid, and yellow-green in hue: some showed a long transparent horn in front, visible as the animalcule pursued a steady course; behind it was open like a cap. They presented much disparity both in form and size. They swam actively by means of cilia. These germs continued visible throughout October, but, though carefully preserved, they led to no ultimate results.*

Since the earlier pages of this article were issued, I have been favoured with an interesting letter from Miss Gloag, of Queensferry, Fifeshire, who has long been a successful *cultivator* of Anemones. I regret that limited space forbids my giving her communication *in extenso*: I am compelled to select and abridge. This lady finds *troglodytes* abundant on the Fife coast, in several varieties. Of these she specially enumerates *lilacina*, of which eight specimens have from time to time occurred; *Hesperus*, two specimens, and a third well-marked variety. One of the var. *Hesperus* has been in Miss Gloag's possession fifteen months: "the disk and tentacles are, if possible, *whiter* than snow; only at the extreme tip of each tentacle is it quite black. It is a little gem of beauty." This variety frequently elongates two of its tentacles to the length of an inch; when they lose their opaque white colour, and become transparent, the tip, however, retaining its black hue.

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* Rem. Anim. of Scotl.; 226, 227.

The new variety is very showy: it has a bright orange disk, and perfectly black tentacles: thus reversing the colours of *Eclipsis*. It may be added to the catalogue, as *var. φ. Pyromela.*

Some of my lady-readers may be glad to avail themselves of Miss Gloag's experience in collecting. "I find no difficulty in digging the *troglodytes* out of the rocks or mud. The instruments I use are long, thick hair-pins [of iron-wire, $\frac{1}{16}$th of an inch thick]. I am obliged to have them made for the purpose; but they are splendid, and seldom fail to bring out the treasure unhurt. After getting my fingers nearly skinned, I bethought me of *hair-pins*. When I see a *troglodytes* that I wish to possess, I take one of these strong pins in each hand, and as quickly as I can I put the bent ends down the fissure as close as I dare to the creature: when I think I have reached its base, I work them gently but firmly towards each other, till I feel I have detached the Anemone, when it is easily lifted out either with the fingers or with the pins."

More recently still, Mr. D. Robertson has sent me from Cumbrae an exquisite variety, of which I was at first inclined to make a distinct species. It has the characteristic marks of *troglodytes*, however, on disk and tentacles. Column marked with longitudinal green bands on a pellucid olive ground. Tentacles very short and conical, pellucid, with three transverse white bars, and three longitudinal streaks of fine grass-green, reaching from the middle to the tip; one frontal, broad, the others lateral, narrower. Disk pellucid olive, with a white lip. This variety I enumerate as χ. *Prasinopicta.*

All the varieties of this species are hardy in confinement, and accommodate themselves readily to almost any kind of bottom. Many observations (some of which have been already mentioned) concur in showing its tenacity of life under circumstances, such as long imprisonment in a box, foul water, &c., that would prove fatal to other species. It requires attention, however, in the aquarium, to preserve it in condition. The more beautiful varieties, at least, speedily degenerate both in size and colour, if they be not frequently and regularly fed. They possess a healthy appetite, and will greedily devour fragments of raw fish or flesh, or of univalve or bivalve *mollusca.* Perhaps the best food for all Anemones, and one that can generally be commanded, is the uncooked flesh of the oyster or the mussel. It should be cut into small pieces, and guided gently to the disk or tentacles of the Anemone, when fully expanded. If the animal shrink from the food, and contract; or if it be allowed to lie on the disk ungrasped, it will be of little use to allow it to remain: remove the fragment, and wait a hungrier moment.

If the food be gradually sucked in, its remains will be disgorged in the course of a period varying from a few hours to several days. Often it will appear little changed; but it has performed its part, and must be carefully removed, or its decomposition will be likely to spoil the water, and kill, or at least render sickly, the living tenants. The fragments may be removed by means of a bent spoon at the end of a stick, by boxwood pliers sold for the purpose, or by a glass tube closed at one end by the finger.

The following somewhat extensive list includes all the British localities of this species that have come to my knowledge:—

Wick, *C. W. P.:* Moray Frith, *A. Robertson:* Coast of Fife, *Miss* (*J. C.*) *Gloag:* Frith of Forth, *T. S. W.:* Berwick Bay, *G. J.:* Cullercoats, *R. Howse:* Guernsey, *E. W. H. H.:* Dover, *J. R. Mummery:* Hastings, *C. K.; E. C. Holwell:* Seaford, *E. W. H. H.:* Selsey, *G. G.:* Weymouth, *W. Thompson:* Teignmouth, *R. C. J.:* Torquay, *P. H. G.:* Falmouth, *W. P. C.:* Ilfracombe, *G. T.:* Tenby, *P. H. G.:* St. Bride's Bay, *H. Owen:* Menai Strait, *W. A. L.:* Mersey Estuary, Hilbre Island, *E. L. W.:* Birkenhead, *J. Price:* Morecambe Bay, *F. H. W.:* Man, *E. Forbes; F. H. W.:* Frith of Clyde, *A. B. C.:* Cumbrae, *D. R.:* Belfast, *E. P. W.*

coccinea.
TROGLODYTES.
viduata.

THE SNAKE-LOCKED ANEMONE.

Sagartia viduata.

PLATE III. *fig.* 3; VI. *fig.* 11.

Specific Character. Tentacles very extensile, very flexuous, indistinctly barred; marked with an uninterrupted dark line down each side.

Actinia viduata.	MÜLLER, Zool. Dan. Prod. 231. No. 2799. Zool. Dan. ii. 31; pl. lxiii. figs. 6—8.
? undata.	IBID. Zool. Dan. ii. 30; pl. lxiii. figs. 4, 5.
anguicoma.	PRICE in Johnst. Brit. Zooph. 2nd Ed. p. 218; fig. 48. GOSSE, Devon. Coast, 96; pl. i. figs. 9, 10.
? lacerata.	DALYELL, Rem. Anim. Scotl. 228; pl. xlvii. figs. 12—17.
Isacmæa viduata.	EHRENBERG, Corall. 34.
Sagartia viduata.	GOSSE, Linn. Trans. xxi. 274; Tenby 363; Man. Mar. Zool. i. 28; Ann. N. H. Ser. 3. i. 416.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks, but readily detached. Considerably exceeding the column.

Column. Smooth, slightly corrugated in contraction; with distinct suckers on the upper half. Substance fleshy. Form cylindrical; capable of great elongation, in the shape of a tall and slender pillar. Margin tentaculate.

Disk. Flat; the margin plane. Outline circular. Radii distinct; crossed by fine striæ.

Tentacles. About two hundred, arranged in five rows; of which the first and second contain each twelve, the third twenty-four, the fourth forty-eight, the fifth ninety-six. Those of the first row are longest; but there is not so much difference between the rows in this respect as is the case with the preceding species: those of the first row, when fully extended, are longer than the width of the disk; all are slender, tapered to a fine point, and very flexuous. They are usually carried either arching downwards on every side or sub-erect, and thrown into many irregular snaky curves.

Mouth. Set on a low cone. Lip thin; slightly furrowed.

Acontia. Emitted from various parts of the body, from the base to the summit, occasionally; but very reluctantly, and in small quantity: short and slender.

COLOUR.

Column. Ground tint a light buff, sometimes merging into a warm fawn, or wood-brown, at others into a flesh-hue, or even pale scarlet. This is marked with longitudinal bands of paler hue, sometimes almost white; the bands being equal to the interspaces. As these bands approach the base they become more defined, and the contrast between the alternate dark and light hues is beautifully distinct, especially as they are separated by slender jagged lines of very dark brown. The whole upper parts are freckled with numerous brown dots; and the suckers are generally inclosed each in a little olive blotch.

Disk. Ground tint a dull whitish-grey, covered with a regular speckled pattern, formed of the following elements. At the point where each tentacle springs from the disk, the radius is marked by a long dash of deep brown, or blackish, at each edge; the intervening space between the dashes is occupied by a transverse band of pellucid greyish-brown; two other similar bands cross the radius at equal distances, but without the bounding dashes. As the markings of the secondary radii do not coincide in position with those of the primary, the result is the minutely chequered or dotted pattern above spoken of. Gonidial radii often opaque white.

TENTACLE (*right side*).

Tentacles. Translucent grey, marked on each side with a line of dark brown running through the whole length. Occasionally a very faint ring of pellucid white surrounds the tentacle near its middle, and a second just above its foot: the lateral lines are lightened at these places, but their continuity is not interrupted. They end abruptly just above the junction with the disk.

Mouth. Greyish white; with darker furrows.

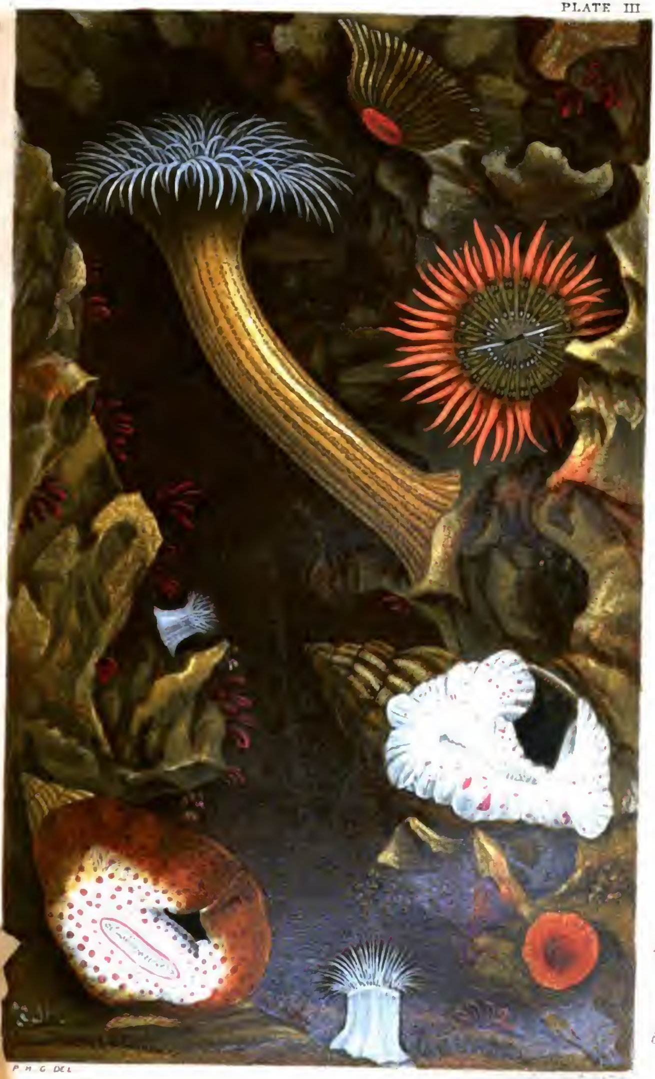
SIZE.

Average specimens in the button state are about five-eighths of an inch in height, and the same in width of column; the base covering an area of nearly an inch in diameter. Such a specimen in ordinary expansion would spread an inch and a half from tip to tip of the tentacles. But specimens an inch and a quarter in height and width in the button are not rarely met with.

LOCALITY.

It is widely scattered over the European coasts. Where found it is generally common, adhering to rocks and loose stones, between tide-marks;

PLATE III



1 2 SAGARTIA TROGLODYTES. 4 5 S. PALLIDA.
3 S. VIDUATA. 6 S. PURA.
7 8 ADAMSIA PALLIATA.

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and is especially abundant on a sandy bottom in the laminarian zone, where it appears to be nearly or quite free, since it is washed ashore by hundreds after a gale.

VARIETY.

The only distinctly marked variety that I have noticed besides those diversities of the general tint that I include in

α. *Aleurops*,*—the mealy-faced condition above described,—is

β. *Melanops*;† which has a broad well-defined band of deep black, crossing the disk and tentacles; just as if a dash of ink had been struck across the whole flower; including in its breadth three or four tentacles of each row on each side. The band crosses at right-angles to the line of the mouth; the gonidial radii of which are white.

Sagartia viduata is somewhat liable to be confounded with *troglodytes;* and some varieties of the latter approach it very nearly, especially when closed. But an experienced eye will seldom be deceived; the tint of *viduata* is a warmer brown, generally mealy, or speckled; that of *troglodytes* tends to drab, smoky brown, or olive, and is not speckled: the stripes of *troglodytes*, when present, are closer, generally narrower, and rarely extend far from the base; the suckers, too, which are so obvious and so constantly used in *troglodytes*, are inconspicuous in *viduata*, and rarely used for attachment. Then, when expanded, the peculiar pattern of each disk respectively does not merge into the other, though in *troglodytes* it is apt to become evanescent: the tentacles in this latter very rarely show obscure lateral lines; in *viduata* these marks are constant and conspicuous: the more slender form of these organs, and their tendency to assume irregular curves, in *viduata*, are also a very good distinction.

I have no hesitation in identifying the species which we get so abundantly in Torbay, and which I have described above, with Mr. Price's *anguicoma;* though that gentleman has not noticed the characteristic tentacle-lines. Its remarkable power of elongation in the dark, alluded to by him, I have often noticed. The finest specimen I have ever seen used to stretch up at night in the form of a perpendicular column, five inches in height, with a thickness of about two-thirds of an inch; from the summit of which the numerous slender tentacles, arching outward on all sides, and extended to extreme tenuity and translucency, gave to the whole animal somewhat of the appearance of an elegant palm-tree. This form I have endeavoured to imitate in Plate III. fig. 3; though the engraver has not succeeded in conveying an adequate idea of the shadowy character of the tentacles, which look like a thin light blue cloud when seen against a dark background. The more ordinary appearance I have given in Plate VI. fig. 11.

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* Ἄλευρον, meal; ὤψ, the face.

† Μέλας, black; ὤψ, the face.

But as little doubt exists in my mind that the species is the *viduata* of the "Zoologia Danica." I have before me at this moment specimens, which answer almost precisely to Müller's description, even in such minute characters as the number of the white bands (twenty-six in mine, "viginti-quatuor" in his); the dark brown speck, with a white dot in its centre—"puncto pertuso"—at the summit of each main band; the slender evanescent line between the bands—"inter has strigas alia tenuior et pallidior;" the longitudinal dark lines of the tentacles—"lineolâ duplici longitudinali obscurâ;" and even the minute depression in the middle of each tentacle at its foot—"foveola versus basin:" all these points I trace readily; and while they do honour to the precision of the great Danish zoologist, they abundantly prove the identity of our species with his. Whether his *undata* is not a variety of the same, I am not sure.

The *Actinia lacerata* of Dalyell I also incline to identify with the present,—from what he says of the colour, the length, form, and contour of the tentacles, the card-like, abject flatness of the body in contraction, and the elongation at night.*

The name *viduata* ("widowed") probably alluded to the white and black lines, which seem to have been remarkably contrasted in Müller's specimen. Mr. Price's name—*anguicoma* ("snake-locked")—is far more suggestive and significant; and I regret that the law of priority forbids me to adopt it.

Mr. Holdsworth has found some curious anomalies in the tentacles of a specimen in his possession. He first observed that all these organs assumed a nodulous appearance, being abruptly thickened into knobs at regular intervals in their length. The phenomenon disappeared and recurred several times, sometimes lasting two or three days. About a fortnight after my friend had favoured me with a record of this fact, he wrote me again as follows:—"The *viduata* that had the knobbed arms has taken a new freak, and not being content with a normal number of tentacles, must needs throw out branches from some of them. I inclose a sketch of the most conspicuous." From the drawing it appeared, that while some of these organs were but slightly notched at the tip, others were divided nearly half-way down, the branches diverging in various degrees; while one bifurcate tentacle had one of its branches cleft. A similar phenomenon has occurred to my own observation in *Aiptasia*, and in *Anthea*.

It is by no means common for either *viduata* or *troglodytes* to emit the filaments, which I call *acontia*, from the loopholes of the column; but I have witnessed the fact on several occasions. From the mouth they are protruded much more readily. In both species they are crowded with long oval *cnidæ* about .002 inch in length, and under; which discharge an *ecthorœum* about one and a half times the length of the *cnida*, and densely bearded.

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* Rem. Anim. of Scotland, p. 228.

Of the increase of this species I have no information, unless the *lacerata* of Sir J. Dalyell be truly identical with it. He observed that this increases by spontaneous separations of portions of its base. The outline becomes irregularly sinuous, and the prominences gradually (in the course of a week or two) become pinched off, maintaining their connexion only by a very slender lengthened filament, *not in contact with the glass, but free above it.* Rupture of the connecting thread at length takes place, and the independent fragment develops itself into a young Anemone. The laceration of the outline of the parent was always very irregular and ragged. Above seventy were thus produced in a year from a single adult.*

Sir John Dalyell could never detect any embryo or germ inclosed in the portion of margin about to be separated: and the careful experiments of Dr. T. S. Wright appear conclusively to negative that hypothesis which would thus explain the mode of increase by fission of the base. From an attached individual of *Actinoloba dianthus*, Dr. Wright cut a minute piece of the base, having first ascertained, by careful examination of the part, which was perfectly transparent, that no ovum or germ existed there. The part immediately receded from the parent, and in three weeks had become a perfect Anemone, with long tentacles. From this small one he cut two other minute slips, which also assumed the perfect condition; and from the base of the original adult fourteen other slips yielded the same results. From these experiments it appears that all that is essential to the process is the existence of a portion of each of the three elementary tissues of the animal—the tegumentary, the muscular, and the epithelial or ciliated lining-membrane of the cavity.*

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* Op. cit. p. 228.

S. viduata is hardy in an aquarium, and needs no special care or peculiar treatment. It expands principally during the hours of darkness; a shaded angle suits it best.

The following are the British localities in which it has been recognised :—

Felixstowe, *Miss M. E. Guille:* Dover (rare), *E. L. W.:* Guernsey, *E. W. H. H.:* Bournemouth, *Rev. J. Guillemard:* Torquay (abundant), *P. H. G.:* Dartmouth, *E. W. H. H.:* Falmouth, *W. P. C.:* Ilfracombe, *P. H. G.:* Tenby, *P. H. G.:* Menai Strait, *J. P.;* (abundant) *W. A. L.:* Puffin Island, *E. L. W.:* Mouth of the Dee, *F. H. W.:* Dublin Bay, *J. R. Greene; E. P. W.:* Belfast Lough, *W. T.:* Lahinch (Co. Clare), *E. F.*

	troglodytes.	
bellis.	VIDUATA.	[impatiens.]
	coccinea.	
	parasitica.	
	A. amacha.	
	A. cereus.	

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* Edin. Phil. Journal, for 1856.

THE PARASITIC ANEMONE.

Sagartia parasitica.

Plate II. *fig.* 6.

Specific Character. Large, pillar-like; skin coriaceous; tentacles in seven rows, marked with a many-broken line down each side.

Actinia effœta.	Rapp, Polyp. 54; pl. ii. fig. 2 (An Linnæi?).
parasitica.	Couch, Zooph. Cornw. 34; Corn. Fauna, iii. 80; pl. xv. figs. 1, 2. Johnst. Brit. Zooph. Ed. 2. 228, pl. xli. Cocks, Rep. Cornw. Pol. Soc. 1851, 8, pl. ii. fig. 11. Gosse, Aquarium, 144, pl. iv. Tugwell, Manual, pl. vi.
Sagartia parasitica.	Gosse, Tr. Linn. Soc. xxi. 274; Ann. N. H. Ser. 3. i. 416.

GENERAL DESCRIPTION.

Form.

Base. Adherent, generally to shells. Little exceeding the column.

Column. Minutely corrugated on the upper parts, but studded on the lower half with numerous warts, mostly small, but a few among the rest large and prominent. No apparent suckers. Substance firm, somewhat coriaceous. Form, that of a thick pillar; the height twice or thrice as great as the diameter; plump and rounded. Margin forming a slightly thickened rim, minutely notched, scarcely rising above the level of the disk, and obliterated when the disk is fully expanded.

Disk. Nearly flat, or slightly concave; the margin somewhat membranous, wider than the column, which it overarches; occasionally it is thrown into puckered undulations, but only to a small extent. Radii not prominent.

Tentacles. Five hundred or upwards; arranged in about seven rows, of which the first contains about twenty, the second twenty-four, the third forty-eight, the fourth ninety-six; those of the other rows are too numerous and too closely set to be enumerated. The first row springs from the disk at about half-radius,—that is, midway between the lips and the margin they occasionally stand erect, but more frequently arch outwards in elegant overhanging curves. When distended, those of the first row are often an inch in length, and one-eighth of an inch in thickness: the others diminish in regular gradation, until those of the margin do not exceed a line in length. Their form varies in different individuals, and perhaps at different times, sometimes being blunt and nearly cylindrical, at others tapering to a fine point.

Mouth. The centre of the disk gradually swells into a stout low cone, in the centre of which is the mouth, edged with a thick furrowed lip.

Acontia. White, long, and as thick as sewing-cotton; projected on the slightest irritation, and in the most copious profusion, both from the mouth and from the loop-holes of the column.

Colour.

Column. Ground-colour, a dirty white or drab; often slightly tinged with pale yellow: longitudinal bands of dark wood-brown, reddish- or purplish-brown, run down the body, sometimes very regularly, and set so closely as to leave the intermediate bands of ground-colour much narrower than themselves: at other times these bands are narrower, more separated, or broken into chains of dark spots. Immediately around the base the bands usually sub-divide, and are varied by a single series of upright oblong spots of rich yellow, which are commonly margined with a deeper brown than that of the bands. The whole column is surrounded by close-set faint transverse lines of pale hue, sometimes scarcely distinguishable, except near the summit, where they cut the bands in such a manner as to form, with other similar lines which there run lengthwise, a reticulated pattern.

Disk. Pellucid yellowish-white, often tinged with faint purple about the half-radial region, and marked with a circle of six squarish patches of opaque white.

Tentacles. Pellucid, faintly tinged with flesh-colour, cream-yellow, or purplish; each marked with a dark purplish or brown line down each side, which is broken into about five dashes. The sub-marginal rows, which from their minuteness may be compared to a fringe, are frequently divided into alternate patches of colour;—a patch of pale tentacles, then one of purplish,—six groups of each colour completing the circle. These alternations do not conceal the lateral lines of the tentacles; and though sometimes beautifully distinct, they are at others scarcely perceptible. The pale patches correspond to the square spots of white on the disk.

TENTACLE (*front*).

Mouth. Opaque white, or cream-white.

Size.

It frequently attains a height of four inches, with a diameter of two and a half in column, and three and a half in flower.

Locality.

The shores of the British Channel, the Mediterranean and Red Seas; in the coralline zone. For the most part adhering to such shells as are inhabited by the Soldier-crab.

VARIETIES.

Though subject to considerable diversity in colouring, I am scarcely able to select any pattern sufficiently distinct, or sufficiently stable to warrant its registration as a named variety. I have above defined the limits within which, so far as my experience goes, the divergence extends; it seems mainly to consist in the relative proportions and arrangements of the dark and light bands of the columns. One mentioned to me by Dr. Hilton, of Guernsey, as having been found by him at Herm, seems more worthy than any other of being considered as a distinct variety. It "had a very light coloured body, and was beautifully marked with lilac spots." Perhaps I may venture to call it *Amethystina*. I have seen a specimen at Torquay, in which the stripes of the column were dark crimson.

The keen eye and scientific zeal of old Ellis failed to discover this species, notwithstanding its large size and commanding appearance. Common as it is in some localities, it seems, however, to be quite unknown along the eastern coasts of great Britain and Ireland, whence Ellis's zoophytic treasures were principally gathered. It was left for Mr. R. Q. Couch, of Penzance, to indicate it as a British species, though it had long been known in the Adriatic and Mediterranean seas.*

I have found it exceedingly abundant in Weymouth Bay,—extending from the deep water of the offing even into the narrow harbour,—but have never heard of its being found within tide-marks, except in the instance of the var. *amethystina*, above mentioned, which was found attached to a stone at low-water mark. It is, as its name imports, normally parasitic in its habits; though not so strictly but that we frequently dredge specimens adhering to stones; and in captivity it is by no means uncommon for an individual to detach itself from its native site and adhere to the bottom of the vessel, or even to crawl up the perpendicular side. Generally, however, it is found seated on some univalve shell, which is tenanted by a Soldier-crab: young specimens on *Turritella terebra*, *Trochus magus*, *T. ziziphinus*, &c.; but adults, which are much more frequently met with than the young, almost invariably on the great Whelk (*Buccinum undatum*). The dredge, indeed, often brings up shells invested by this Anemone, which are empty; but I believe that in every such case the shell has recently been vacated by the Soldier, and that the *Sagartia* never voluntarily selects either an empty shell, or one tenanted by the living Mollusk, for his residence.

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* With Dr. Johnston I utterly and indignantly reject Linnæus's specific names in the *Actinoida*, and with reluctance even cite them.

My friend, Dr. E. Percival Wright of Dublin, has favoured me with a humorous sketch of the ways of this loving pair,—Crab and Zoophyte, *Arcades ambo*,—which bears on the matter before us. "The following scene," he observes, "was witnessed by my much lamented friend Dr. R. Ball. One of the specimens referred to, attached to the shell of a *Buccinum undatum*, which had from its appearance been, in all probability, just deserted by a *Pagurus*, was placed in a glass aquarium: in a short time the Anemone left the *Buccinum*, and attached itself to the side of the tank; it next deserted this position and fixed itself on the side of a large stone that filled the centre part of the aquarium. After the lapse of some weeks, a Hermit Crab was dropped into the tank (I think *Pag. bernhardus*). Well, if these Hermits can't live without hiding themselves in the deserted shell of some poor Mollusk, I think it is equally true that they can't live happy until they hide both themselves and their shells in some quiet little hole in the rock-work of our aquaria, from whence they can look out; and, thinking that the superimposed stone-work adds vastly to the strength of their fortifications, experience sundry intense feelings of safety. Be this as it may, the Hermit in question was not long ere he walked up to a little grotto that was in the rock-work of the aquarium (quite close to the *Sag. parasitica*); and after a slight survey to see that all was right, he turned his left shoulder forward and 'backed in:' then he began to whisk his antennæ and foot-jaws in a dreadful manner, and looked evidently quite content. I suppose this was a state of things the parasite perched on the rock above had long been waiting for; for it was not long in moving its disk over the top of the small whelk; and before the Crab knew where he was, the big *Sagartia* had pitched his tent on the roof of the Hermit's house. Where the Hermit Crab goes, there goes the *Sagartia:* a quiet life it led before; a restless one it has to lead now. But doubtless it knows what's best for it."

The crab who sustains the honourable office of porter to this species is invariably the brawny-limbed *Pagurus bernhardus*, as *P. Prideauxii* is favoured with the support of *Adamsia palliata.* In the rude and blundering manner in which the bearer performs his office, it cannot be but that the poor Anemone sustains many a hard knock and many a rough squeeze among the rocks and stones over which his servant travels; but he appears to bear these mischances with great philosophy: I know of no species which lives so constantly exposed. A rude shock will, indeed, cause it to withdraw its tentacles, and contract its disk into that button-like shape which is common to the tribe; but this is only for a moment; it instantly expands again, and remains full blown in spite of all its draggings hither and thither. Its skin is peculiarly tough and leathery; a provision, doubtless, against the accidents to which its vagrant life exposes it.

Mr. R. Q. Couch says that the favourite site for this Anemone (in the neighbourhood of Penzance?) is on the claw of the Corwich Crab (*Maia squinado*). Mr. Cocks, however, says that in the neighbourhood of Falmouth it is never found on this Crab, nor on *Pinna ingens*, but frequently on *Pecten maximus*, as well as on *Buccinum undatum*, and on stones.* I do not remember myself to have ever seen it on a bivalve.

We have no species of Sea-Anemone which, to such an extent as this, shoots forth those filaments which I have called *acontia*, and which are undoubted weapons of offence. On being rudely handled, or otherwise alarmed, from various points of the body, particularly from the larger warts, the loop-holes (*cinclides*) give issue to these threads, which exactly resemble in appearance white sewing-cotton. They are often shot forth with force to the length of four or even six inches; and under circumstances of great irritation an immense bundle of such threads is projected from the mouth. Their interior end remains, however, attached to the cavity whence they issued, and they are soon withdrawn again.

Most species of Anemones give out a rank penetrating odour, but it is more than usually offensive in *S. parasitica*. It is communicated to the fingers on handling the animal; and repeated washings with soap, and even scrubbings with a brush, scarcely avail to remove it. It is insufferably nauseous.

S. parasitica, like its congeners, is by turns oviparous and viviparous. To the former mode of increase Mr. G. H. Lewes bears witness. "In the water of a pan containing, among other animals, specimens of *Actinia parasitica*, I twice noticed abundance of light-purple ova floating at the surface. Some of these were placed in a vase by themselves, and others left in the pan; but no further development took place. One day, dissecting a *parasitica*, I found in its ovaries these very purple ova which had attracted my attention."†

Mr. Lewes doubts, however, that it is viviparous. This point has been settled by my friend, Mr. F. H. West. "A specimen," he writes, "which I received in December from Weymouth, produced a young one on the 1st of March following; it was most beautifully and distinctly marked, and as dark-coloured as the parent, which was of the dark reddish-brown variety. It was a pretty little creature, and lived for five or six weeks, when I lost sight of it." Mr. Holdsworth also has met with the young of this species, not more than a line in height, yet distinctly marked like the adult.

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* Johnston, Br. Zooph. 228.

† Sea-side Studies, 141.

As a proof of the tenacity of life of Anemones under the privation of sea-water, provided the skin be preserved from becoming dry by evaporation, I may mention the following fact, which is valuable as bearing on the transmission of these animals from distant localities. I inclosed two large specimens of *S. parasitica,* two of *T. crassicornis,* and one of *A. dianthus*, in a large jar, containing one or two tufts of *Chondrus crispus*, but no water. The jar was closed with a bung, but was not air-tight. The Anemones remained thus imprisoned for ten days, wallowing in their mucus and discharged water, which from time to time I poured off. At the end of that time they were quite well, and I restored them to the aquarium. Might not the species from North America, or those from the Mediterranean, be transmitted to us thus inclosed? I should add that the experiment was performed in December.

The following are the known British habitats of this species. Guernsey, Herm, *J. D. H.:* Jersey, *G. H. Lewes:* Weymouth, *P. H. G.:* Teignmouth, *R. C. J.:* Torquay, *P. H. G.:* Falmouth, *W. P. C.:* Penzance, *R. Q. Couch:* Bantry Bay, *E. P. W.*

viduata.
———?
bellis. PARASITICA. A. palliata.
B. coronata.

THE GOLD-SPANGLED ANEMONE.

Sagartia (?) chrysosplenium.

PLATE VI. *fig.* 8.

Specific Character. Column green, with lines of golden-yellow dots: tentacles pellucid, with green bars.

Actinia chrysosplenium.	COCKS, Rep. Cornw. Polyt. Soc. 1851, 5; pl. i. fig. 17. JOHNSTON, Brit. Zooph. Ed. 2, 214; pl. xxxvii. figs. 1—3.
Sagartia (?) chrysosplenium.	GOSSE, Annals N. H. Ser. 3. i. 416.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to stones: slightly exceeding the column.

Column. Smooth, studded with numerous scattered suckers (or loopholes), resembling punctures. Form shortly cylindrical, becoming conoid in contraction.

Disk. Smooth.

Tentacles. Few, nearly equal in size, rather short, stout, and obtusely pointed.

Mouth. Set on a roundish cone. Lips slightly puckered or imperfectly furrowed.

Acontia. None have been observed.

COLOUR.

Column. Green, varying in tint from a bright pea-green, to that of a dark holly-leaf; marked with longitudinal bands of spots of a rich golden yellow; a line of the same golden hue margins the base.

Disk. Yellowish-brown; gonidial tubercles bright golden yellow.

Tentacles. Pellucid, sometimes nearly white, crossed by transparent green bars.

SIZE.

About an inch in height; the diameter of the base and of the flower three-quarters of an inch; that of the column five-eighths of an inch.

LOCALITY.

The coast of Cornwall. Under-surfaces of stones at extreme low water, and rock-pools.

To Mr. W. P. Cocks, of Falmouth, to whose scientific research our zoology is largely indebted, Dr. Johnston owed the admission of this species into his "History of British Zoophytes." I am under obligations to the kindness of the same gentleman, who has favoured me with some additional notes on the species, and a beautiful coloured sketch, which I have copied in Plate VI.

The generic position of this beautiful form I indicate not without doubt. The short conical tentacles, crossed with bars, suggest a relationship with *Tealia;* and this affinity had occurred to its discoverer, who in one of his MS. notes has added the words,—"allied to *crassicornis*." On the other hand, the marginal line around the base, and the gonidial tubercles being distinguished by a different colour from the rest of the animal, while agreeing *inter se*, suggest *Actinia*, of which these peculiarities are characteristic. There is, too, a well-known variety of *A. mesembryanthemum*, which is green, marked with lines of yellow dots, and of this circumstance I ventured to remind Mr. Cocks. His reply was as follows: "In the *A. mesembr. var.* the stripes and spots are as in *chrysosplenium*, but several shades lighter, and the labial tubercles, as well as the edging of the base, are bright blue; the tentacles are uniformly of one colour, and are much more numerous, slender, and tapering."

The character of the surface, however, decidedly separates it from both the *Actiniadæ* and *Bunodidæ*. My friend had at first written,—"Suctoreals numerous, scattered, embedded;" but he afterwards added the following particulars:—"When I examined the body of the *chrysosplenium* with a lens of two inches' focus, the surface appeared to be pierced or punctured, and in appearance resembled a piece of smooth India-rubber when pierced with a pin; not the slightest trace of tubercles apparent. The body when contracted was as smooth as before; not papillated; and the apertures were nearly obliterated."

Until I have an opportunity of personal examination, I therefore assign to the species a place in the genus *Sagartia;* but I consider that it is one of the links which connect this with the neighbouring families.

On the history of this lovely little Anemone I can only quote what has already been published. "The old ones are solitary, not more than one on a stone: but there are two or sometimes four growing on the same stone. . . . I have had some in my possession for weeks, well supplied with water and air daily; yet the tubercles and edging were obdurate, determined to keep to their original colour." I must hope that the zeal of our Cornish zoophytologists will before long make me personally acquainted with the pretty Gold-spangle.

The following localities are enumerated for it by Mr. W. P. Cocks:—Gwyllyn-Vase, Pennance, Helford, St. Ives.

———?
mesembryanthemum. CHRYSOSPLENIUM. crassicornis.
———?

ON THE SUBDIVISION OF THE GENUS SAGARTIA.

Fifteen species of the genus *Sagartia* have been described in the preceding pages; and I possess information more or less definite concerning some five or six others, which I have not seen; whose history therefore, in hope of a fuller acquaintance with them, I defer writing for the present, but expect to be able to give some account of them in an Appendix to this Volume.

The species already described appear to me to be divisible into four or five groups, which cannot, however, be properly considered as higher than sub-genera, the characters by which they are distinguished being too vague to afford a basis for generic rank.

The most typical group, and that for which, should the genus be broken up, I would retain the name *Sagartia*, includes the following species :—*miniata*, *rosea*, *ornata*, *ichthystoma*, *coccinea*, *venusta*, *nivea*. These have conspicuous suckers, discharge acontia freely, attain only a moderate elevation, expand the disk only a little beyond the column, are for the most part painted with gay colours, often in striking patterns, and in particular have the column usually of a rich warm brown hue.

A group rather less typical than this, I consider to be formed by the following species :—*sphyrodeta*, *pallida*, *pura ;* to which will probably be added most of the species which I defer to the Appendix. These have no conspicuous suckers; discharge acontia less and less abundantly; are in general destitute of positive colour, and have a tendency to a colourless transparency. *Nivea* and *sphyrodeta* are the links which unite these two groups. Should a generic name ever be required for this group, I propose for it that of *Thoe*, one of the sea-nymphs. (*Hes. Th.* 245.)

Troglodytes, *viduata*, and *parasitica* may be associated as a group departing still more widely from the typical form. Their suckers are distinct, but minute; their power of emitting acontia varying (feeble in *trog.* and *vid.*, strong in *paras.*); their tentacles are generally streaked (only occasionally in *trog.*) with lateral longitudinal lines; their column is marked with longitudinal bands of lighter and darker colour; they have the power and habit of greatly elongating the column; and manifest a proneness to become and to continue detached. In these last two particulars they approach the *Ilyanthidæ. Coccinea* and *parasitica* are the links of connexion between the first group and this, though not *inter se.* In the event of re-distribution, this group might receive the name of *Cylista*, from κυλίω, to wallow about.

Bellis will probably be considered by many as worthy of generic separation. The slenderness and elongation of its column when fully expanded, the salver-like expanse of its disk, the small size, great number, and crowded arrangement of its tentacles, the undulation of its margin, as well as the peculiarities of its colouring, isolate it strongly from its fellows. *Miniata*, from the undulation of its margin, and *parasitica*, from the craterine form of its disk, and the multitude of its tentacles, are connecting links with it in their respective groups; while *bellis* looks, as has been already intimated, towards other genera, as *Actinoloba, Aiptasia*, &c. It might be called *Scyphia*, from σκύφος, a drinking-bowl.

Finally, *chrysosplenium* is the most aberrant form that I have included in the genus, so far as I am able to judge of its peculiarities without personal inspection. Its affinities I have just enumerated. If I had isolated it generically, I would have named it *Chrysoela,* "that which is studded with golden nails," from χρυσὸς, gold, and ἧλος, a nail.

GENUS III. ADAMSIA (FORBES).

Medusa (BOHADSCH).
Actinia (ADAMS).
Cribrina (EHRENB.).

Base adhering to the inner lip of univalve shells; greatly expanded laterally in two wing-like lobes, which, gradually advancing on each side, at length surround the mouth of the shell, and meet on the outer side of the body-whorl.

Column greatly depressed; margin forming a low sharp parapet, with a distinct fosse. Surface smooth towards the summit, striated or irregularly furrowed on the outer (= lower) part; pierced with loopholes, which, on the outer (= lower) part, form permanent warts. Substance fleshy.

Disk, long-oval, almost linear, smooth.

Tentacles numerous, sub-marginal, short, crowded, imperfectly retractile.

Mouth protrusile, large, thrown into loose folds, but not furrowed.

Acontia emitted freely and copiously.

The genus contains but one known species, *A. palliata.*

THE CLOAK ANEMONE.

Adamsia palliata.

Plate III. *figs.* 7, 8.

Specific Character. Body studded with purple spots.

Medusa palliata.	Bohadsch, Anim. Marin. 135; pl. xi. fig. 1.
Actinia maculata.	Adams, Linn. Trans. v. 8. Coldstream, Edin. New Phil. Journ. ix. 236; pl. iv. figs. 6, 7.
carciniopados.	Otto, Nov. Act. Acad. Nat. Cur. xi. 288; pl. 40.
picta.	Risso, L'Europ. merid. v. 286.
Cribrina palliata.	Ehrenberg, Corall. 41.
Adamsia maculata.	E. Forbes, Ann. Nat. Hist. v. 183.
palliata.	Johnston, Brit. Zooph. Ed. 2. i. 207; fig. 44; pl. xlii. figs. 1, 2. Gosse, Aquarium, Ed. i. 139: Man. Mar. Zool. i. 27; fig. 38; Ann. N. H. Ser. 3. i. 416.

GENERAL DESCRIPTION.

Form.

Base. Circular in youth; dilating laterally with age, until the two sides, curving round, meet and unite with a suture, forming a ring; adherent to the mouth of turbinate shells of *Gastropoda*, which it sometimes invests with a horny membrane.

Column. Exceedingly thin, low, and flat: the margin forming a low sharp-edged parapet, with a distinct, but narrow fosse. Substance fleshy, soft. Surface quite smooth for about one-third of the distance from the margin to the edge of the base; then it begins to be marked with fine radiating depressed lines. These lines meet those from the opposite side, where the two divisions of the body unite on the upper lip of the shell, and alternating with them make a zigzag suture. The outer half of the column is moreover generally thrown into irregular folds and puckers. Loopholes numerous, large, pierced in the centre of slight elevations of the skin, which are most conspicuous on the outer portions.

Disk. Very long and narrow, smooth.

Tentacles. Numerous, arranged in four sub-marginal rows; nearly equal, short, cylindrical, obtusely pointed, crowded, not completely retractile.

Mouth. Protrusile, long, oval: the lips thrown into coarse folds, but not furrowed; throat and stomach marked with close-set white furrows.

In the only specimen in which I have had an opportunity of examining the mouth with exactitude, there was only one gonidial groove, with its pair of tubercles. And this was so placed, as to make the bisecting line of which it formed the termination, one *at right angles* to the lateral development of the animal into lobes.

Acontia. Long and thick; emitted in great profusion, on the slightest irritation.

COLOUR.

Column. Sienna-brown, or reddish-brown on the outer portions, marked with bluish longitudinal lines, and gradually melting into the purest white on the upper third; the whole studded with large round spots of the most brilliant purplish-rose, which are most distinct in the middle third. Margin surmounted by a line of delicate pale scarlet, crowning the parapet.

Disk. Pure white.

Tentacles. White, with a faintly-dark core.

Mouth. White.

Acontia. Rose-lilac, with the suture, formed by the edges of the infolded ribbon, white.

SIZE.

Large specimens attain two inches and a half in diameter, measured from edge to edge along the curve, as they adhere to the shell; but the long diameter of such individuals, if measured from the suture round the ring, along the line of the disk, to the suture again, would be not less than five or six inches. The height from the parapet to the surface of the shell is about one-third of an inch. Tentacles one-third of an inch in length.

LOCALITY.

The coasts of Europe generally. Deep water. "They seem to love a muddy bottom, mixed with gravel and dead shells." (D. R. in litt.)

VARIETIES.

α. *Rhodopis.* The condition described above. (Plate III. fig. 7.)

β. *Crinopis.* Whole body pure white; unspotted (Forbes); or marked with a few scattered, mostly minute, pink dots. (P. H. G.) (Plate III. fig. 8.)

The name of this genus was assigned to it by the late Edward Forbes in honour of John Adams, who first described the animal as British. It had, however, been described and figured by Bohadsch before him, and by many since, "both at home and abroad," and by no one more accurately than Dr. Coldstream, the principal parts of whose account are cited in Johnston's "British Zoophytes," (Ed. 2, p. 207.) The true character of the animal has been pointed out by myself in "The Aquarium," in which I have thus explained its manner of growth. — "The *Adamsia* is evidently an Actinia of a long-oval form, capable of development in its long diameter into two lengthened wings. Its instinct invariably leads it to select as its support the inner lip of some univalve shell; having adhered to which, the lateral expansions creep along the shell, following its surface until they have surrounded the aperture, and meet each other on the *outer* lip. Here the meeting edges unite by mutual adhesion, and seem to grow together; yet the suture is always distinctly visible, both by a slight depression, and by a pale line which assumes a zigzag form, owing to the terminations of the body-striæ fitting into the interspaces of the opposite ones."*

In Plate III. fig. 8, I have depicted an individual, adherent to the shell of *Buccinum undatum*, in which the lateral lobes, though projected around the edges of the mouth of the shell, have not yet met each other on the outer lip, but are separated by a space of a quarter of an inch. And I have seen a very young specimen, less than half an inch in diameter, the outline of which was exactly like that of a normal Anemone; the lateral lobes not having yet commenced their extension. This little individual was adherent to the inner lip of the shell of a Garden Snail (*Helix aspersa*), which had been accidentally washed into the sea. A *Pagurus Prideauxii* had selected the same shell as his abode, and to his wanderings it was probably owing that the shell had found its way into eight fathoms' water, a mile or two from land.

This manner of growth is further illustrated by what takes place at the disease and death of the animal. The adhering base begins to peel off, and shrink away from the shell. This process invariably *begins at the suture*, and as it goes on the suture divides, the lateral portions separating more and more from each other by shrinking; thus reversing the steps by which the annular habit was assumed.

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* Aquarium; Ed. i. p. 139; *et seq.*

So far as my own experience goes, the *Adamsia* always selects for its support the inner lip of a turbinate shell. *Buccinum undatum* I have generally seen chosen at Weymouth, but not rarely the various species of *Trochus;* and a *Helix* I have already mentioned: Adams found it at Milford Haven, on *Murex despectus* (= *Fusus antiquus*)*:* Thompson, at Belfast, on *Bulla lignaria*, as well as on the larger *Trochi:* E. Forbes, at the Isle of Man, on old *Fusi* and *Trochi:* Landsborough, at Arran, on *Turritella* and *Buccinum.* Mr. D. Robertson sends me specimens from Cumbrae, on *Trochus umbilicatus.*

I believe that the shell chosen is always tenanted by a Hermit Crab, and that the species is invariably *Pagurus Prideauxii.* In this my observation coincides with those of Dr. Coldstream, Thompson of Belfast, and Mr. D. Robertson. Forbes seems to throw doubt on the constancy of this association; having taken many specimens on the Manx coast, the shells of which were not tenanted by any crab. Similar examples have occurred to myself at Weymouth; but when we remember how readily the *Pagurus* leaves its shell on alarm, and how terrifying the rough action of the dredge-iron must be, it seems the most obvious mode of accounting for the occasional vacancy of the shell, that it has been just deserted by its frightened tenant.

The *Adamsia* itself in early life has the power of shifting its quarters. Forbes observes that it "seems to change its habitation according to its size:" and I have had two young specimens in my aquarium, which crawled spontaneously from their shells, and attached themselves the one to a stone, the other to the frond of a sea-weed. While writing this article, Mr. D. Robertson sends me accounts of two in his possession, which manifested the same propensity. Each first detached the two lobes from the shell, which then were thickened, and apparently hollow, being much distended with water. The same evening, both began to adhere to the side of the jar in which they were kept, by their lateral lobes. Three days afterwards, the lobes were "still firmly and broadly adhering to the bottom and sides of the jar." Mr. Thompson, of Weymouth, has dredged a specimen, which was adherent to a frond of *Fucus serratus*. It was round, about as large as a shilling, and flat, but "with the appearance of a suture down one side, as though it had joined."

Very frequently, there is found intervening between the *Adamsia* and the shell to which it is affixed, a film of membrane, of a horny texture, somewhat brittle, of a translucent dark greenish-brown colour. After death this film is found adherent to the surface of the shell, from which, however, it easily peels when dry. It invariably extends beyond the margin of the lip, making, as it were, an adventitious continuation of the shell, and following the same general spiral direction. From several specimens from the Frith of Clyde, for which I am indebted to the kindness of Mr. D. Robertson, I have been able to learn the nature and object of this membrane. In one of these the shell of *Trochus umbilicatus*, full-grown and perfect, had a great continuation of the membrane into a fictitious body-whorl, as voluminous as the whole shell. In another, the shell was that of *Buccinum undatum*, an inch and a half in height. Here the membrane was confined to a small film, sub-triangular in outline, continuing the *front* margin of the outer lip, and a similar one continuing the *hind* margin of the same; each the production of a lateral lobe of the animal, the two not having as yet attained the point of union. In a third beautiful specimen, sent me alive, I found, after death, the membrane showing distinct concentric lines of growth. And these took exactly the form of the outer edges of the two lobes, meeting in the centre, where there was a representative suture. The growth-line being curved, there was a delta at the end of the suture; and this was filled with a much thinner film of membrane, showing that it was the last made.

Mr. Walter Gregor, of Macduff, has sent me a large specimen which had in youth chosen a shell of *Natica sordida* for its support. The shell is in no direction more than one-third of an inch in diameter, but the adventitious body-whorl of membrane measures (along its curve) two inches and three quarters!

From these and other observations of my own, as well as from information supplied by Mr. Robertson, it appears to me manifest that the membrane is a provision for the support of the growing *Adamsia*, when it has selected small or broken shells.

Experiments, which I have detailed at length elsewhere,* have satisfied me that the membrane is produced by the *Adamsia;* that it is an epidermic slough; and that it is composed mainly of chitine, having no calcareous element. It cannot, therefore, in any respect, be regarded as a corallum.

The membrane is not invariably present. In specimens dredged in the Frith of Clyde, small or broken shells appear to be usually chosen; and these are enlarged, as I have stated above. In Weymouth Bay, however, where the species was common when I was there in 1853, the shell most commonly selected being the Great Whelk, the membrane is so unusual that I do not remember to have ever seen it.

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* Annals and Mag. of Nat. Hist. for Aug. 1858.

Pagurus Prideauxii seems to be as dependent on the *Adamsia*, as the latter is on it. The only instance in which I have heard of its having been ever found dissociated from its friend, is the following, communicated to me by Mr. Robertson :—

"Lately I dredged a small *Pagurus Prid.* unassociated with *Adamsia palliata.* After a few days I put it into a jar with an *Adamsia* which I have had for some time. I saw them six hours after; *Pagurus* had left his shell, and was perched on the top of *Adamsia*, with his fore claws among the tentacles. Next morning *Pagurus* was dead, and *Adamsia* had quitted the hold of his shell."

This association, however, like so many other things that the naturalist is constantly meeting with, is unaccountable. Why one species of Soldier-crab must needs seek the companionship of this Anemone, while other Soldier-crabs are able to live alone; and why this species of Anemone must needs associate with the Soldier-crab, while other kinds of Anemone are solitary, I can by no means answer. Nor is the difficulty in any wise solved by supposing—what we may easily grant—that each may find advantage from the other's presence. Dr. Landsborough pleasantly says,—"In all likelihood, they in various ways aid each other. The Hermit has strong claws; and while he is feasting on the prey he has caught, many spare crumbs may fall to the share of his gentle-looking companion. But, soft and gentle-looking though the Anemone be, she has a hundred hands; and woe to the wandering wight who comes within the reach of one of them, for all the other hands are instantly brought to its aid, and the Hermit may soon find that he is more than compensated for the crumbs that fall from his own booty."

It is probable that *Adamsia* would be a dainty morsel for the table. I have not essayed it, but the smell of the fresh animal is very agreeable, resembling that of the cooked flesh of the crab.

Beautiful as it is, it appears unlikely ever to become an habitual tenant of our aquariums, as it cannot long endure captivity. Its crab, too, seems peculiarly unable to survive confinement; and I do not think the Cloaklet will ever live long dissociated from its companion.

Yet Sir John Dalyell seems to have been more successful than I have been, if I may judge from the expression "a long time" in the following statement. One which had detached itself from its shell "diffused the base on the bottom of a glass vessel, not unlike the wings of a butterfly. But until it adheres, the base remains a long time with its whole under surface merely folded together." He describes it as feeding readily, and as greedy of worms.

According to the same observer, thousands of minute, opaque, bright yellow globular germs are produced by the species in July, August, September, and October; several hundreds being discharged at once; but no results followed these developments in his experience.*

Rapp assigns *Adamsia palliata* to the Mediterranean and North Seas:† MM. Koren and Danielssen mention it as common in fifteen to twenty fathoms off the coast of Norway.‡ The following list includes its known British habitats:—

Wick, Peterhead, *C. W. P.:* Moray Frith, *W. Gregor:* Guernsey, *J. D. H.:* Weymouth Bay, *P. H. G.:* Torbay,

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* Rare and Rem. Anim. of Scotl.; 233.

† Polyp. 58.

‡ Faun. Litt. Norv. ii. 87.

P. H. G.: Falmouth, *W. P. C.:* Milford Haven, *Adams:* Isle of Man, *E. F.; F. H. W.:* Arran, *D. L.:* Cumbrae, *D. R.:* Bute, *Dr. J. Coldstream:* Oban, *Mrs. A. Murray Menzies:* Strangford Lough, Belfast Bay, *W. T.:* Bantry Bay, *E. P. W.*

——?
PALLIATA. S. parasitica.
——?

GENUS IV. PHELLIA (GOSSE).

Base adhering to rocks; little exceeding the column.

Column pillar-like in expansion; the margin tentaculate, without parapet or fosse. Surface smooth, pierced with loop-holes; partly clothed with a tough epidermis, which is rough externally, firmly adherent to the skin.

Disk concave; the edge not undulate.

Tentacles few, in more than one row; barred.

Mouth not raised on a cone; lip thickened.

Acontia discharged, but reluctantly.

ANALYSIS OF THE SPECIES.

Epidermis dense; free and tube-like at the upper part; its surface not warted	*murocincta.*
Epidermis dense; firmly adherent throughout; warted .	*gausapata.*
Epidermis thin; firmly adherent throughout; not warted	*picta.*

THE WALLED CORKLET.

Phellia murocincta.

PLATE VII. *fig.* 2; XII. *fig.* 8 (*magn.*).

Specific Character. Epidermis dense; free and tube-like at the summit; its surface not warted.

Phellia murocincta. GOSSE, Annals N. H. Ser. 3. ii. 193.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; slightly exceeding column.

Column. Cylindrical, pillar-like when expanded, slightly grooved longitudinally, smooth, but partly clothed with a dense, rough, membranous skin, which is firmly adherent from the base about half-way up, but there becomes free, forming a loose firm sheath or tube, from which the animal protrudes its fore parts in extension, and into which it retires at will, more or less completely. Surface of epidermis rough, but not warted. Height, in full extension, double the diameter.

Disk. A deep cup, bounded by the thick feet of the inner tentacles.

Tentacles. Twenty-four, in two rows, twelve in each; those of the first row twice as large as the others, with which they alternate: variable in form, sometimes strongly conical, stout at the foot, and pointed; at other times nearly cylindrical and obtuse: they have a tendency to assume a knotted appearance: they are generally carried hanging over the margin with a double curve, like the branches of a chandelier; but sometimes those of the inner row stand erect.

Mouth. Not raised on a cone, so far as could be ascertained.

Acontia. Emitted sparingly and reluctantly.

COLOUR.

Column. Exposed portion having a mealy appearance, produced by a number of whitish longitudinal lines and dashes, more or less speckled and interrupted by the ground-colour, which is pellucid yellowish grey. Of these lines, twelve are] broader, and between these are about four slender lines in each interspace. The margin becomes deep buff, producing a depression of that hue when in the button-state.

Epidermis. Pale buff, studded with dirty foreign matters.

Disk. Dull buff, marked with a white star, which is formed by a forked line proceeding from the front of each primary tentacle towards the mouth. Two broad white gonidial radii.

Tentacles. Dark brown, pellucid, crossed by three narrow remote rings of white. Where the foot of the tentacle unites with the disk, its radius has a white patch, succeeded by two parallel, longitudinal, black dashes.

Mouth. Rich buff.

SIZE.

Diameter of column one-eighth of an inch; height one-sixth; expanse of flower one-sixth.

LOCALITY.

Overhanging rocks and sides of caverns near low-water mark, around Torquay.

The large dark overhung pool at Petit Tor, which I have more than once described, is a fertile nursery of marine life. Though situated not much lower than half-tide level, yet, from the volume of water which it contains, the constancy of its fulness, the aspect, excluding the sun's rays, and the inclination of the rocks preventing evaporation, the rough worm-eaten surface, both below and above the brim, is always wet, always dark, and always crowded with Algæ, Sponges, Zoophytes, Worms, and Mollusks. This profusion of riches is not always, however, easily available; for though it stands in tantalising proximity to the eye of the naturalist, it is quite beyond the reach of his hands, unless he choose to wade into the pool and work in the water breast-high.

On the 29th of June of the present year I essayed in this manner to rifle the promising treasury; and the result by no means disappointed my expectations, though, from several circumstances, it was difficult to work with hammer and chisel. Among other things I obtained there this new form.

It has been my custom,—and I recommend the plan to brother and sister naturalists,—not to satisfy myself with such creatures as I see on the spot, but to take specimens of the rock at random for examination at home. I look out for the dirtiest, roughest, most corroded parts of the rock, at the lowest level that I can reach, and with the chisel cut off small fragments. These I bring home, and spread out, face upward, in shallow pans of clean sea-water. After a few hours, say perhaps the following morning, I carefully search with my eye, aided at intervals by a lens, but without disturbing the water, the surfaces of the bits of rock, as well as the sides of the vessel; and thus I have obtained more than one new species, which I might never have known otherwise.

For the actual discovery of the present species, I am indebted to my little son, whose keen and well-practised eye detected the tiny atom, as a form with which he was unacquainted, on one of the fragments I had brought home. Presently afterwards I discerned another specimen; and these two are the only examples that have as yet come under my notice.

The rough corky appearance of the epidermis in this and the following species, suggested the generic name, which is formed from φελλὸς, the cork-tree, and also its bark. The specific appellation indicates the chief distinction between this and the following species, the edge of the epidermis encircling the summit of the animal when contracted, as if with a wall. The force of the English appellation is obvious.*

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* I feel that I am arrived at a point where I need the kind consideration of my readers. Popular as the cultivation of Zoophytes has become, there are still many who prefer to call them by English names, the ladies in particular. It is a natural and proper desire, and I wish to respond to it. But no vernacular terms exist, by which the hitherto recondite subjects of this work are known. What shall I do in this case? Shall I use the term

In both this and the preceding genus we find a remarkable development of the epidermic layer; in *Adamsia* from the base, to enlarge its support,—in *Phellia* from the column, to thicken its investing coat.

The investment is, as I have intimated, a tightly-adhering epidermic layer, but free at the upper part, which stands up as a thin, clear, firm tube, when the animal retreats. Its substance is strong and tenacious, yet portions of it can be torn away in shreds with a needle. These, under a power of 600 diameters, show, in the clear parts, a structureless membrane, which has a slightly fibrous appearance, apparently only because of its foldings and wrinkles. The greater part is rendered opaque by the foreign matters entangled in it, consisting largely of irre-

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"Anemone" throughout, employing an epithet to discriminate the families from each other, a second epithet to discriminate the genera of each family, and a third epithet for each species? "The Anemone:" "the Warty Anemone:" "the Lined Warty Anemone:" "the Glaucous Lined Warty Anemone." This would be an available mode, but would it not be repulsive and lumbering? Again, I might make new words—arbitrary aggregations of vowels and consonants,—"Farson," "Toler,"—words, if words they might be called, without an etymology, and without a meaning. I do not think this would be generally acceptable, though I might plead precedent in scientific technology,—"Rocinela," "Conilera," &c. for example.

A celebrated Greek orator is said to have coined only three words in the whole course of his professional eloquence; and, for the comfort of those who should attempt the same again, it is added that the Athenian public refused to swallow these. Yet it is much easier to make a Greek word than an English one. I manufacture "Aiptasia" and "Bolocera" boldly; yet it is not without mistrust that I see "Trumplet" and "Opelet" on my pages.

In this dilemma, since the words must be made, I have thought that they ought to be formed according to certain conditions. First, they should be Saxon: "Ilyanth," "Lucernary," "Cyathine," are no more English than if they retained their classical terminations. Secondly, they should be significant: the new word should aid the memory, not tax it. Thirdly, they should be consimilar in structure, since they are intended to designate consimilar objects. Fourthly, they should not, if possible, exceed a dissyllabic length.

According to these rules, I have ventured to construct a series of vernacular names for the genera. Allowing "Anemone" to stand for *Sagartia*, I have formed for each of the others a dissyllable, Saxon in origin, suggestive of some prominent character, and having a common termination, —viz. the English diminutive "-let," from liꞇ, little. In accordance with this plan, Plumelet may stand as the English representative of *Actinoloba*, and Cloaklet of *Adamsia*.

gular, clear granules, with some Alga-spores, Diatoms, and here and there a cnida.

I removed, with a fine needle's point and pliers, the epidermis piecemeal. It was tough, allowing the Anemone and its bit of rock (as large as a filbert) to be lifted out of the water by it, without giving way. Its adhesion to the lower part of the column was very firm. As I removed the loose free tubular portion, (the animal having retreated far in at the earliest assaults,) I discovered free within its cavity about half-a-dozen egg-like germs, of a rich deep orange colour; these, under the microscope, proved to be covered with vibratile cilia, by means of which the germ slowly swam. They were soft, ovate, ·04 inch long, by ·025 wide. One, on being crushed, was resolved into a mass of minute round clear granules,—fat-corpuscles?

When the whole epiderm was removed, I detached the animal from its adhesion in a small hollow of the limestone; not without the discharge of a thick mucus from the base, and the emission of a single acontium from the lower part of the column. The animal was now reduced to an abject flatness, and looked like a miniature *S. viduata* in its greatest contraction.

In a day or two it attached itself to the rock again, and even crawled a little way. It now expanded freely, and looked just like an ordinary *Sagartia;* but did not renew the epidermis.

The only locality as yet known for the species has been already indicated:—Torquay, *P.H.G.*

	————?	
A. palliata.	MUROCINCTA.	E. carnea.
	gausapata.	
	picta.	

THE WARTED CORKLET.

Phellia gausapata.

PLATE VII. *fig.* 1.

Specific Character. Epidermis dense; firmly adherent throughout; warted.

Phellia gausapata. GOSSE, Annals N. H. Ser. 3. ii. 194.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks: scarcely exceeding column.

Column. Cylindrical, pillar-like when expanded; smooth in extension, but in contraction becoming coarsely corrugated, so as to present large irregularly rounded knobs or warts. To this a dense epidermis is firmly adherent throughout, having no free margin; and, being modelled on it, it is covered with coarse warts or knobs; "resembling, when contracted, a straw bee-hive." (*C. W. P.*)

Disk. A deep cup or funnel.

Tentacles. Sixteen, arranged in two rows, eight in each: those of the first row twice as thick and long as those of the second, with which they alternate; variable in form, sometimes being conical and pointed, at others short, rounded, and even slightly inflated at the tips.

Mouth. Not raised on a cone: lip thickened "as in *dianthus.*"

Acontia. Freely discharged from the base; long and very slender.

COLOUR.

Column. Exposed portion pellucid white, with sub-opaque whitish longitudinal streaks.

Epidermis. Pale yellowish, with darker warts; the separation of which in extension causes the general tint to appear lighter, and *vice versâ.*

Disk. (No note has been taken of its colours.)

Tentacles. Pellucid drab, with the lower part and a broad ring near the tip dark brown, undefined: probably there is also an intermediate ring of paler brown.

SIZE.

Diameter of column half an inch; height three-fourths of an inch.

LOCALITY.

Rocks at low-water: extreme north-east of Scotland.

By a curious coincidence, on the very day that I discovered the preceding species, the post brought me a living specimen of the present, from Mr. C. W. Peach, of Wick; and so the extreme north-east of Scotland and the south-west of England conspired, at the same moment, to augment our native *Actinologia*, each with a species of a genus entirely new to science.

The kindness of Mr. Peach had, it is true, sent me a specimen of the same animal before this, viz. in the preceding May; but it had arrived dead, and in so advanced a stage of decomposition, that I had not been able even to form a conjecture of its characters. Observation of the species is even now very defective; for though the last specimen sent arrived in health, and continued for upwards of a month to live in my possession, yet, during the whole of that period, I never saw it expand sufficiently to enable me to describe either its tentacles or disk. For the above description I am largely indebted to the notes and sketches of Mr. Peach.

The distinction between *Phellia gausapata* and *P. murocincta* is slight; and future observation may resolve the two species into one. The distance of their respective localities, however, renders their identity less probable.

The specimens were obtained from very narrow fissures in a rock called Proudfoot, at the entrance of Wick Bay, in Caithness. This rock is accessible only at the low water of spring-tides. The first specimen obtained, which was much larger than the second, remained unattached for several days, while in Mr. Peach's possession, but appeared healthy. The smaller one sent to me remained adherent to its original fragment of rock for more than a month; at the end of which time I lifted the base from its attachment. It was in doing this that I saw the acontia copiously discharged from the offended base.

When received, several young algæ,—one apparently a minute *Laminaria*, another a *Rhodymenia palmata*,—were growing from the upper margin of the epidermis; a fact which is of value as showing the persistency of this investment, which, moreover, was not separated during the subsequent period of the animal's captivity.

The trivial name of this species I have formed from the *gausape*, or rough frieze coat which the Roman soldiers wore in cold weather.

The only known locality for this *Phellia* is, as above stated,—Wick, *C. W. P.*

——————?
GAUSAPATA.
murocincta.
picta.

THE PAINTED CORKLET.

Phellia picta.

(Sp. nov.)

PLATE XII. *fig.* 1 (*magn.*).

Specific Character. Epidermis thin; firmly adherent throughout; not warted.

GENERAL DESCRIPTION.

FORM.

Base. Adherent; scarcely exceeding column.

Column. Cylindrical, pillar-like when expanded, capable of great elongation; permanently smooth; clothed with a very thin membranous epidermis, which is not warted, but carries minute extraneous matters entangled in it. It is wholly adherent, and extends about half-way up the column.

Disk. Nearly flat or slightly concave.

Tentacles. Thirty-two, arranged in three rows, 8, 8, 16, = 32; thick, long, and bluntly pointed; one or two of the first row often much enlarged temporarily, and standing erect, the rest sub-horizontal.

Mouth. Not raised on a cone; but the lip very protrusile; thin.

Acontia. Not observed.

COLOUR.

Column. Pellucid white, with opaque white streaks.

Epidermis. Transparent and colourless.

Disk. Delicate yellow; bounded by an irregular circle of dark brown, formed by a broad band crossing the foot of each tentacle; the whole crossed by radial lines of pure orange which spread between the tentacles: —a beautiful pattern.

Tentacles. Pellucid white, the front face crossed by three bands of opaque white.

SIZE.

Diameter and height, in ordinary expansion, one-eighth of an inch: expanse of flower one-sixth.

LOCALITY.

North-east coast of Scotland: old shells in deep water.

Since the preceding article was in type, I have received the little Corklet above described; which differs so greatly from the others, that I must either regard it as specifically distinct, or else consider all three as constituting a single species, subject to an unusual amount of variation. I have no right to assume the latter conclusion, and therefore prefer the former.

The only specimen that I have seen was sent me by the kindness of Mr. Walter Gregor, of Macduff, near Banff, who obtained it, in October, from deep water, adhering to an old shell of *Cyprina Islandica.* "When put into a basin of water," observes its discoverer, "it lengthened itself to a great extent without throwing out its tentacles. Before doing so, it assumed a globose form, and expanded very slowly, withdrawing its tentacles on the least agitation of the water." When it came into my own possession, it adhered very readily, and expanded with great freedom; feeding eagerly on raw meat. The epidermis, which is very delicate, can be detached in shreads without difficulty: it holds minute atoms of sand in its substance.

It is a brilliant little species, and I have named it from its beauty of coloration.

The only recognised locality is—Banff, *W. G.*

PICTA.
gausapata.
murocincta.

GENUS V. GREGORIA (Gosse).

Base not broader than the column.

Column a low pillar, strongly invected, very inflatable in irregular lobes; the margin forming an irregularly undulate parapet, separated from the tentacles by a deep but narrow fosse, which is never obliterated. Surface smooth, but becoming transversely wrinkled in contraction; without suckers; perforated with few, but very conspicuous loop-holes; these are arranged in longitudinal lines, on the swellings, which correspond to the intersepts. Substance pulpy.

Disk plane; not exceeding the column; smooth, without conspicuous radii.

Tentacles moderately short, blunt, unicolorous; not perfectly retractile.

Mouth set on a cone; lip thin; two gonidial grooves, each with a pair of small tubercles.

Acontia emitted sparsely.

THE EYELET.

Gregoria fenestrata.

(Sp. nov.)

PLATE VII. *fig.* 3; XII. *fig.* 7 (*magn.*).

Specific Character. Column green, with purple lines; tentacles red.

GENERAL DESCRIPTION.

FORM.

In addition to the characters given on the preceding page, I may add, that in my specimen, (which may be immature,) the perforations are very visible, with a lens: there are about six in an intersept, of which five are placed in quick succession near the summit, and one remote near the base: they are not found in all the intersepts, from two to four imperforate ones intervening between those which are pierced. Under magnification the perforations are rounder, and less eyelid-shaped than in the *Sagartiæ;* they have a distinct granular layer exterior to them, though their outline is in some cases very clearly defined, and even thickened.

The tentacles are about forty-eight, arranged in three rows; all submarginal: their form is nearly cylindrical, with very obtuse tips.

COLOUR.

Column. Translucent glaucous green, very pale; each longitudinal furrow marked by a line of deep reddish-purple, decided but not well-defined; the loop-holes are each surrounded by a ring of the same colour.

Disk and tentacles. Dull red, pellucid; exactly as in the common varieties of *A. mesembryanthemum.*

Mouth. More decidedly lake-red. Throat glaucous.

SIZE.

Column about one-sixth of an inch in height, and one-fifth in diameter: expanse of tentacles one-third.

LOCALITY.

The Scottish coast near Banff; half-tide level.

Mr. Walter Gregor, of Banff, (after whom I have named the genus,) has just favoured me with this little Anemone, which is highly interesting, as presenting a link which connects *Sagartia* with *Actinia.* The disk and tentacles are exactly those of *mesembryanthemum;* and the texture of the column, and its style of colouring, are such as to give the impression that the most familiar of our Actinioïds is before us. Yet, on examination, the perforation of the integument, the presence of acontia, and the absence of spherules, indicate its place among the *Sagartiadæ.* At the same time, its indifference to contact, and its permanent expansion,—for it seems not to have the power of retracting the tentacles,—are peculiarities which ally it to the members of the following family.

I have seen but a single specimen, which may be immature. The specific and English appellations allude to the perforations of the column-wall, which are very striking. It attaches itself readily by the base; is constantly swelling out part of its body in lobes; and generally remains widely expanded, with the tentacles arching outwards and downwards. It feeds eagerly, and appears quite hardy in captivity.

Only locality known—Banff, *W. G.*

A. dianthus.
FENESTRATA.   A. cereus.
A. mesembryanthemum.

FAMILY III.—ANTHEADÆ.

In my "Synopsis of the British Actiniæ," (see Annals of Nat. Hist. for June 1858,) I had associated *Anthea* with *Actinia*, in one family, distinguished by the negative character of lacking suckers, warts, and loop-holes. But groups founded on negative characters are always unsatisfactory; and maturer consideration has convinced me that the positive diversities of these genera are of sufficient importance to warrant their separation into distinct families.

The members of the family *Antheadæ* are marked by a great development of the tentacular system. The tentacles extend to a remarkable length,—in the typical genus often reaching to twice or thrice the diameter of the disk,—and are very flexuous. These organs have thinner walls than usual, but are lined with a thick coat of comparatively large pigment-grains of a deep brown hue. They show a greater tendency to discharge the water which ordinarily distends them, by contracting in diameter than in length, the effect of which is, that these organs under irritation collapse into a shrivelled or withered condition.

Another remarkable peculiarity is the almost total inability to retract the disk and tentacles, and to close over them the margin of the column,—the common mode in which Actinioïds seek protection from annoyance. It is true that, on rare occasions, and when perfectly undisturbed, I have seen both *Anthea* and *Aiptasia* in this retracted condition; but still, even then, there is a tenseness and globularity in the covering column which is at once seen to be peculiar, and which suggests the notion that the effect is produced more by the distension of the column than by the contraction of the disk. In these cases, too, the slightest touch (which, in a *Sagartia* or *Actinia*, under similar circumstances, would only cause a closer contraction) is followed by the instant recession of the column, and the protrusion of the tentacles.

The whole body manifests comparatively little contractility. The shrinking of the parts from every touch, which in the *Bunodidæ* and the *Sagartiadæ* is so excessive, going on even after decomposition has set in, and which is so annoying and so baffling to the anatomist, prevails to a far less degree in the *Antheadæ;* and hence the family presents favourable conditions for dissection. The power of discharging mucus is also comparatively small.

Though ordinarily adherent by the base, the power of adhesion is unwontedly feeble in the family; the animals can be detached with the slightest force, and often spontaneously free themselves. Both of our British genera have the habit of frequently crawling to the brim of the water, and then expanding their base upon the surface and allowing it to dry, floating by means of it with the body inverted, and the tentacles expanded in mid-water.

An attentive observer sees in the habits of the *Antheadæ*, and particularly in the lively and flexuous movements of the tentacles, an indication of superior muscular power in these organs, and also a higher degree of intelligence, or at least of perceptive faculty, than the *Sagartiadæ* possess.

Besides our own two genera, *Aiptasia* and *Anthea*, one or two exotic genera must belong to the family. If Mr. Dana has correctly described the *Act. flagellifera* of Madeira, it must be generically distinct, notwithstanding its very close resemblance in figure and colour to the green variety of *Anthea cereus.* He speaks of the inner row of tentacles as furnished with *a retractile pencil of hair* at the tip.[*] Nothing corresponding to this peculiarity belongs to either of our species; but it is so utterly abnormal, that I cannot help suspecting some source of illusion: and the more, because I learn from Mr. Holdsworth, that *Anthea cereus* is abundant at Madeira.

However, the *A. pustulata* of the same author[†] must certainly constitute a distinct genus of this family. It appears to be essentially an *Anthea*, but with the column covered with warts. It would form, therefore, an osculant form, connecting *Antheadæ* with *Bunodidæ;* as our *Aiptasia*, in its *acontia* and *cinclides*, links the family with the *Sagartiadæ.*

The New Norwegian genus, *Actinopsis*,[‡] must, I suppose, be referred hither.

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[*] Dana's Zoophytes, 126; pl. i. fig. 1.

[†] Ibid. 128; pl. i. fig. 2.

[‡] Faun. Litt. Norv. ii. 89.

ANALYSIS OF THE GENERA.

Mouth normal.	
Skin smooth.	
Column long, trumpet-shaped: furnished with acontia and cinclides	*Aiptasia.*
Column short, broad: destitute of acontia and cinclides	*Anthea.*
Skin warted (*Not British*)	"*A. pustulata*"
Gonidial tubercles elongated	*Actinopsis.*

GENUS I. AIPTASIA (GOSSE).

Anthea (COCKS).

Base adhering to rocks, readily detached; often not equalling the medium diameter of column.

Column trumpet-shaped, many times higher than wide, very changeable in shape from irregular distension; margin tentaculate; surface minutely corrugated, adhesive, but without distinct suckers; pierced with loop-holes. Substance pulpy.

Disk greatly expanded, membranous, concave.

Tentacles in several rows, long, lax, irregularly flexuous, perforate at the tip, the first row longest, scarcely retractile.

Mouth not set on a cone; lip thin; stomach protrusile.

Acontia abundant, but not often spontaneously extruded.

The genus contains but one known species, *A. Couchii.*

THE TRUMPLET.

Aiptasia Couchii.

PLATE V. *fig.* 3.

Specific Character. Body smoke-brown; disk marked with pale blue lines.

? *Actinia biserialis.*	FORBES, Ann. N. H. Ser. 1. v. 182; pl. iii. JOHNSTON, Brit. Zooph. Ed. 2. i. 221; pl. xxxviii. fig. 1. COCKS, Rep. Cornw. Pol. Soc. 1851, 6; pl. i. fig. 18.
Anthea Couchii.	IBID. Rep. Cornw. Pol. Soc. 1851, 11; pl. ii. fig. 30.
Aiptasia amacha.	GOSSE, Annals Nat. Hist. Ser. 3. i. 416.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks, readily detached; dilated, but smaller than the middle of the column.

Column. Slender just above the base, enlarging upwards, dilating at the summit into a wide hemispheric cup or trumpet-shaped disk; four or five times higher than wide; the form susceptible of great and rapid changes from irregular distension. Margin formed by the outer row of tentacles. Substance pulpy. Surface minutely corrugated in the ordinary condition, but smooth when fully distended, pierced with loop-holes; without visible suckers, yet capable of adhesion.

Disk. Thin and membranous, greatly expanded as a broad concave cup. Outline circular, but lax, and often undulate, or even revolute. Radii strongly marked.

Tentacles. Arranged in four rows: the first row containing six, set at half radius, remote from each other, and from the second row; when fully extended, an inch and a-half long; the other rows diminish gradually, the outermost being about half an inch in length. All, especially those of the first row, very lax, flexuous, frequently thrown into sinuous curves, perforate with a large terminal aperture.

Mouth. Lip thin. Throat irregularly furrowed. Stomach-wall occasionally protruded. Two *gonidia*, scarcely rising into tubercles.

Acontia. Abundant; copiously protruded from the mouth or from wounds; occasionally also, but sparingly and reluctantly, from loop-holes.

COLOUR.

Column. Warm orange-buff, richer at base, blending into a bluish-black hue where it expands into the cup-like disk: the entire length marked with longitudinal faint lines, indicating the insertions of the septa.

Disk. Dark iron-grey, becoming ashy towards the centre: each radius bounded by lines of pale greyish blue.

Tentacles. Sepia brown; but seen under a low magnifying power to be of a warm umber, more or less decided, minutely mottled with darker: the colour usually softens into white at the extreme tip of the tentacle.

Mouth. Lip and throat ash-grey.

SIZE.

When fully extended the column is sometimes four inches in height, and from an eighth to three-fourths of an inch in diameter. Expanse of flower about three inches.

LOCALITY.

The Channel Islands and Cornwall. Under surface of stones at low-water mark; deep water.

In the latter part of March of the present year (1858), Dr. Hilton of Guernsey found on the shores of that island, and kindly sent to me, several specimens of an Anemone new to him, and equally so to me. The locality, the colour of the disk, and much in the form and contour of the animal, at once suggested the *Actinia biserialis* of Edward Forbes, for which species I was on the look-out.

Not long after this, I was indebted to the courtesy of Mr. Sydney Hodges, the Secretary of the Royal Cornwall Polytechnic Society, for other specimens of the same species from Falmouth, which were sent under the persuasion that they were *A. biserialis.* Still so much diversity existed between the specimens (those from Guernsey and Falmouth perfectly agreeing *inter se*) and Forbes's description, that I could not but consider the point very doubtful. At the same time, if I were quite sure that the specimens in my possession were identical with that described by Forbes, I should be compelled to reject his specific name as involving important error. The tentacles can in no sense be called biserial: there are four distinct rows, which are regularly graduated in length, and which show no other distinction; the appearance indicated by his figure (supposing it to represent the present species) being quite illusory.

But on examination I found peculiarities in the animal, which required its generic separation. The most prominent of these were its form, the length and flexuosity of its tentacles, and its permanent expansion. In two of these characters, as well as in several other points which I shall presently notice, it manifested so close an affinity with *Anthea cereus*, that I should not have hesitated to include it as a second species in that genus, had not the presence of *acontia*, and their extrusion through *cinclides*, indicated a nearer approach than is made by that species to the family *Sagartiadæ*. I therefore ventured to describe it under the name of *Aiptasia amacha;* the generic appellation referring to its permanent expansion, from ἀεὶ, always, and πετάω, to expand; and the specific to the patience with which it bore pushings and pokings without unsheathing its weapons, from *a*, priv., and μάχομαι, to fight. The English name refers to its trumpet-like form.

Subsequently, however, I have found that the species has been well described and figured by Mr. W. P. Cocks, in his valuable List of the Actiniæ of Falmouth, published in the Report of the Cornwall Society for 1851, under the title of *Anthea Couchii*, which specific name takes precedence of mine. It is true, in his description, mention is made of three white lines extending longitudinally up the column, of which no trace exists in my specimens; but by a coloured drawing with which Mr. Cocks has favoured me, I perceive that these lines were not equidistant and symmetrical, but all close together on one side; a circumstance which at once shows their presence to have been accidental, and of no value as a character, while in every other respect, even in the most minute points, his drawing and description agree with my specimens.

At the same time it is interesting to observe that Mr. Cocks did not consider his specimens as the *A. biserialis;* for he describes this separately in the same list, as "not uncommon."

Mr. S. Whitchurch, of Guernsey, informs me also that there exist at Herm Actiniæ, which are commonly spoken of as "the yellow and blue varieties of *A. biserialis*," so that a species may yet turn up which will justify the description of that form; and at all events it would be rash at present to accuse so excellent a zoologist as E. Forbes of incorrectness, on the known premises.

The present species seems to be found in considerable abundance in its recognised localities, especially Guernsey and the contiguous little isle of Herm; appearing chiefly to affect the under sides of loose stones at the level of lowest tide, to which it adheres with a very slight attachment.

When the animal has been some time deprived of water, —as in transmission by post,—it has a very abject appearance, shrivelled almost to shreds of blackish membrane, which, when immersed in sea-water, lie helplessly on the bottom, ragged and hideous, discharging brown pigment. Presently the tentacles begin to fill, and one by one to assume plumpness, and to move slowly; and gradually, after some hours, the animal presents a more life-like appearance. The extremities of the tentacles remain collapsed, and apparently withered, long after the greater part of their length has become plump, the division between the one and the other condition being abrupt. The distension begins from the bottom of the tentacle, and passes up very slowly, occupying many hours.

When once it has adhered, and recovered its health, its elegant postures and forms, and its remarkable versatility, make the *Aiptasia* an interesting occupant of the aquarium. It marches from stone to stone, and around the walls of its tank, frequently creeping to the top of the water, and expanding its base upon the surface, almost or even quite floating, while the disk and tentacles, widely expanded, are suspended below in mid-water. In these habits we see a close resemblance to *Anthea cereus*, as also in the texture of the body, and in the tentacles, which in both genera are lined with a profusion of dark-brown pigment-granules, which are readily separated.

Occasionally I have noticed that it has the power of adhesion to foreign bodies by the general surface of the column; a habit common to several of the *Ilyanthidæ*, (as the *Halcampæ*, for example,) but which, I think, is not possessed by *Anthea*.

When in full vigour it towers up to the height represented in the figure, when, with its ever-twisting tentacles and semi-pellucid tapering column, it is a very elegant object. When thus greatly elongated, the loop-holes are plainly seen with a lens. I have been able to thrust the point of a fine needle into one and another of these orifices, without meeting any resistance; and, by using great care, without the animal's being conscious of it; when it did feel the touch, however, it suddenly contracted.

Under these and similar irritations, it contracts in length by successive spasmodic jerks, but makes no attempt to roll in the margin of the disk, or to hide the tentacles in any way. Yet it has the power of involving the disk. It feeds greedily, throwing the margin in folds over the mouth. After a full meal, I have seen it take the shape of a ripe fig, the lower half of the column greatly attenuated, while the upper half was as greatly distended, but with a constriction between the swollen part and the trumpet-like expanded disk.

The appearance of the animal varies exceedingly. Sometimes it lies utterly flaccid and withered, appearing as if quite dead; not contracted, but emptied of its water, and the lax membranes collapsed. Then, especially at night, it swells up, erects its broad disk, and stands up like a flower after a shower, with a noble appearance. At such times the tentacles are sometimes much distended, preserving their regular conical form, and are of a much lighter hue. They are then occasionally constricted with numerous close rings, and take snaky curves. At times the long inner tentacles are curled in ram's-horn coils over the mouth.

One of the individuals in my possession has forked tentacles: one of these organs bifurcated at about half its length; another divided near the tip into three, of which one ramification extended on each side horizontally, and the third, which was much smaller, followed the original direction of the tentacle. This tendency is common to *Anthea cereus*, and to *Sagartia viduata.*

That our *Aiptasia* is tenacious of life will appear from the following curious rencontre, to which a specimen in the possession of Mr. Holdsworth was subjected. "Two days ago," writes my friend, "on making my customary morning's inspection of my family, I missed the *Aiptasia.* A diligent search in all the crevices of the rock-work having failed to discover it, I began to suspect foul play; and after administering the stomach-pump, in the shape of a stick, down the throats of some fine specimens of *bellis,* I succeeded in dislodging the poor lost sheep, in a shapeless mass of membrane and *acontia,* which were largely exposed; but the animal was too much injured to enable me to say whether these were emitted in the usual manner, or exposed by a rupture of the integuments. The invalid was removed to a separate jar of sea-water, (the best hospital for sick *Actiniæ*,) and it is now attached to the glass, which is, as you know, a good symptom, but I can hardly pronounce it to be as yet quite convalescent." Some weeks after I received tidings that the invalid had " perfectly recovered from its involuntary visit to the interior of *bellis*."

As in *Anthea*, the non-retractile character is not absolute in our *Aiptasia;* Mr. Holdsworth has repeatedly seen it with the tentacles quite concealed, the body globose and very pellucid, and the orifice long and linear.

The only localities I am as yet acquainted with for *Aiptasia Couchii* are the following:—

Bordeaux Harbour, Guernsey, *J. D. H.:* Herm, *S. Whitchurch:* Gwyllyn Vase, Helford River, *W. P. C.:* Falmouth, *S. Hodges.*

The species before us forms a beautiful link of connexion between the *Sagartiadæ* and the *Antheadæ*, presenting very marked resemblances to *S. bellis* and *S. viduata* in the former, while the preponderance of its characters allies it with *Anthea cereus.*

	S. bellis.
	S. viduata.
H. chrysanthellum.	A. Couchii.
	[A. rhodora.]
	A. cereus.

GENUS II. ANTHEA (JOHNSTON).

Actinia (ELLIS).
Anemonia (RISSO).
Entacmæa (EHRENB.).

Base slightly adherent; broader than the column: its outline irregularly undulate.

Column forming a low thick pillar; the summit expanding; the margin notched, and bearing budding tentacles, with no distinct parapet, or fosse. Surface cancellated by the intersection of longitudinal furrows, and transverse wrinkles. No suckers, warts, nor loop-holes. Substance pulpy.

Disk membranous, very expansile, undulate at the margin.

Tentacles numerous in several rows, sub-marginal, very long, lax, irregularly flexuous; scarcely retractile.

Mouth elevated on a low cylindrical wart.

Acontia wanting.

The genus contains but one British species, *A. cereus*.

THE OPELET.

Anthea cereus.

PLATE V. *fig.* 2; VI. *fig.* 9.

Specific Character. Tentacles smooth, consimilar.

Actinia cereus.	ELLIS and SOLANDER, Zooph. 2. RAPP, Polyp. 56; pl. ii. fig. 3. GRUBE, Actin. 11.
sulcata.	PENNANT, Brit. Zool. iv. 102.
Anemonia edulis.	RISSO, L'Eur. Mérid. v. 289.
Anthea cereus.	JOHNSTON, Brit. Zooph. Ed. 1, 221. IBID, Ed. 2, 240; pl. xliv. COCKS, Rep. Cornw. Pol. Soc. 1851, 10; pl. ii. figs. 23, 27. GOSSE, Man. Mar. Zool. i. fig. 37. TUGWELL, Man. Sea-Anem. pl. vii.
Anemonia sulcata.	MILNE-EDWARDS, Hist. Nat. Corall. i. 233; pl. C. i. fig. 1.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks, but with a very slight tenacity; dilated considerably beyond the medium diameter of the column; the outline generally undulate, often forming irregular lobes.

Column. Shaped like a dice-box, or a pillar, which is much dilated above and below; when expanded, the diameter usually exceeding the height; the margin greatly overlapping, crenate, with numerous rounded teeth, some of which are usually seen to be rising into incipient tentacles. Surface marked with numerous longitudinal furrows, which are correspondent with the insertions of the septa, and whose upper extremities alternate with the marginal crenations. In the ordinary state of extension, there are also very numerous and minute transverse wrinkles, which cross the furrows at right angles. Skin imperforate, and destitute of any adherent power. Substance pulpy, or bladdery.

Disk. Thin and membranous, greatly expanded in the form of a broad, shallow saucer, with the margin lax and undulate, often revolute. Radii strongly marked; two gonidial radii often more conspicuous than the others.

Tentacles. About one hundred and eighty, arranged in four rows; of which the first, second, and third contain thirty-six each, the fourth seventy-two. These numbers are, however, only approximative; for the crowded condition of the tentacles, the irregularity of their serial arrangement, and the ever-varying distension of the disk, make it almost impossible to count, much less accurately to distribute them into rows. They are sub-equal in length; but what difference there is, is a diminution outwards. All are very long; those of the first row sometimes upwards of four inches in length, and more than doubling the diameter of the disk: they are slender, and taper uniformly to the tip, which is obtuse and as if truncate, or sometimes slightly enlarged; very lax and flexuous, they are almost always thrown about in irregular, snaky curves, intertwisting in all directions. Their entire surface is very adhesive.

Mouth. Seated on an elevation, which more commonly takes a cylindrical than a conical form; sometimes large and tumid, at others small: lip rounded.

COLOUR.

Column. Pale wood-brown, umber-brown, purplish-brown, or flesh-colour, marked with numerous narrow bands alternately paler and deeper, which correspond to the furrows; sometimes the lighter bands are dull light lilac, with darker edges.

Disk. Dark bistre-brown, or umber-brown; the gonidial radii often a lighter shade of the same colour.

Tentacles. Light pea-green or emerald-green, opaque, with a rich, satiny lustre; the extreme tips, for about one-fourth of an inch, rich lilac-crimson; the green gradually blending into the lilac, and the latter hue increasing in brilliancy to the extremity. A faint whitish line usually runs along the back of each tentacle throughout its length.

Mouth. Lip agreeing with the disk; throat ash-brown.

SIZE.

Large specimens are sometimes seen covering an area of six inches in diameter, with their tentacles four inches long; the disk two inches, and the column the same, in diameter.

LOCALITY.

The western and southern coasts of Europe generally. Shallow pools between tide-marks, and littoral rocks.

VARIETIES.

a. Smaragdina. The state described above, with rosy-tipped green tentacles.

β. *Sulphurea.* As the preceding, except that the tentacles are pale delicate lemon-yellow, with the slightest shade of green; lilac-tipped. (Herm: *S. W.* Ventnor.) In the Herm specimen, the tentacles were scarlet at the foot.

γ. *Alabastrina.* Column and disk light translucent olive; tentacles wholly clear waxy white. (Ventnor. Torquay.)

δ. *Rustica.* Column and disk dull brown; tentacles ash-grey, generally with a paler line down the back.

ε. *Punicea.* Tentacles mahogany-red. (*Gaertner.*)

Anthea cereus is one of our most abundant species, at least on the south and west coasts of England and Scotland, and probably all round Ireland. Rapp and Grube indicate it as common in the Mediterranean and Adriatic seas; but the omission of any allusion to it by Müller or by Sars implies that it is unknown in the North Sea. Its abundance where it occurs, its habit of congregating in numbers, and its favourite resort,—shallow pools within tide-marks, protected only by a few inches of water from the full glare of the sun, as well as its size and conspicuous colours,—all conspire to make it familiar to the most cursory observer. It would, probably, be one of the first species of the whole race to become popularly known; and hence it is not surprising that old Rondeletius should take notice of it in the middle of the sixteenth century, including it in his "Libri de Piscibus Marinis," by the descriptive epithet of *Urtica cinerea.*

The late Dr. Johnston separated the genus from *Actinia* in his "Brit. Zooph." Ed. 1; giving it the name of *Anthea*, from ἄνθος, a flower. The specific name of *cereus* seems to have been appropriated to it in accordance with a fancy which Ellis had of naming the Actinioïds after many-petaled flowers,—*cereus* being the name of one of the *Cacti*, now a genus. The waxy appearance of the tentacles in some of the varieties may have influenced him in the selection. The English name I have formed for it alludes to the habitually open condition of the disk.

This is the species, doubtless, which attracted the notice of the poet Southey, when, in the retirement of our wild western shores, he was meditating his oriental poems, and which he has interwoven into their beautiful imagery.

> "Meantime, with fuller reach and stronger swell,
> Wave after wave advanced;
> Each following billow lifted the last foam
> That trembled on the sand with rainbow-hues:
> The living flower, that, rooted to the rock,
> Late from the thinner element
> Shrank down within its purple stem to sleep,
> Now feels the water, and, again
> Awakening, blossoms out
> All its green anther-necks." *

Whether in its native freedom, fringing the edges of some shallow basin in the red sandstone of the Devon coast, or waving its silky tentacles "like streamers wide outflowing," now exposed, now concealed among the black fronds of some undulating *Fucus* to which it is clinging; or throwing them into fitful snake-like contortions as it hangs from the rock-work of a well-kept aquarium,—the *Anthea*, especially the emerald variety, is an exquisitely beautiful object. Its unwonted liveliness also makes it more than usually interesting in the last-named condition; for not only are its tentacles continually in motion, but the animal itself is very restless, frequently changing its place, and that with so much activity that the process can be readily watched by the eye.

For the following graphic note I am indebted to Mr. Robert Patterson, of Belfast. I also have often marked the beauty of *Anthea* under similar conditions, but never in such numbers as he describes:—

"I had on one occasion the pleasure of seeing the *Anthea* under circumstances that I shall not readily forget. Outside the belt of sand and rocks that is left uncovered at every tide [on the south side of Belfast Lough], is another, where the large sea-weeds, such as the tangle and sea-furbelows (*Laminaria* sp.), flourish. . . . As our boat drew nigh to the shore, the large spreading fronds of the sea-weed became more and more distinct, until each was perfectly revealed to us, below the unruffled surface of the sea. We had come at the time of low water; and, as we floated onward, could mark the glorious submarine forest which was beneath our boat. It rose and fell, it heaved and sank, as gracefully as the meadow yields to the breeze, or as the willows bow to the breath of April. As we came into shallower water, the broad outspread fronds of the sea-weed seemed studded with blossoms. What could they be? A few moments more disclosed the mystery: each blossom was endued with life and motion—it was a living *Anthea!*"

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* Thalaba, xii. 3.

The power exercised by this species, pre-eminently, of inflating portions of its body, swelling them out in large tumid lobes separated by deep *sulci* from the rest of the circumference, assists it in crawling. We will suppose the *Anthea* resting on the bottom of the vessel, when it feels a desire to mount the sides of the glass. Pushing out a great inflated lobe towards that side, the sole of which is free from the surface, it takes hold of the glass with the edge of the lobe; and when the contact is firm, relaxing its former hold, it slowly drags forward the body, until the lobe is again lost in the general circumference, or even till the body projects in two smaller lobes, one on each side of the principal one. The base being now made firmly to adhere, again the lobe is freed, and again protruded, and the same process is repeated until the animal is satisfied with the position it has gained. Sometimes this is at mid-height, the intertwined tentacles streaming loosely down by their own weight. At other times it rises to the very water's edge, and even thrusts out its base in an inverted position upon the surface of the water, as if it would float by the mere contact of the dry base with the air, just as the *Limneæ* and many other *Mollusca* do. And not seldom does it boldly break the tie that connects it with the side of the vessel, and actually swim, or at least passively float, with its base in contact with the inferior surface of the superincumbent stratum of air. A little shaking of the vessel, however, causes the water to overflow the frail boat, which had been hitherto dry, when the animal instantly falls prone to the bottom.

No very special care is required to maintain the health and vigour of the Opelet in captivity: as to situation, it will select for itself the position its wayward will may most fancy; and if the water be kept in purity, the lovely creature will survive an indefinite period. It needs to be fed at frequent intervals, or it will droop and die; for it is one of the most voracious of its class. Nothing in the way of flesh or fish comes amiss to it: a day or two ago I had an instructive example of its gluttony. I had just dropped two large ones of the variety *Smaragdina* into my collecting-jar, when I succeeded in capturing a young Conger Eel, about six inches in length and half an inch in thickness. I wish that the sciolists who deny a poisoning power to the organs of the Actinioïds had seen the result of the introduction of the lithe and vigorous fish to the expectant *Antheæ*. *Before it could reach the bottom of the jar*, the green tentacles of one of the Opelets had entwined themselves around its head, and, wrapping the wretch around as if with a cloth, almost in an instant had dragged it to the cavernous mouth, in which it was partially engulphed. My little son, who was with me, begged for the life of the fish; and I drew it by force from the green embrace, in less than five minutes after its capture. But—*de eo actum est!* it was all up with the poor Eel; its eyes were already dimmed in death, and it lay in my hand flaccid and helpless, with only a momentary convulsion or two;—the fatal *cnidæ* of the tentacles had done their work: and when I restored it to the offended gourmand, it was speedily lost to view, coiled up in the capacious maw.

Numerous witnesses vouch for the fact,—though others, myself included, are insensible to it,—that the contact of *Anthea*'s tentacles has a perceptible morbific power on the human skin. One of the most distinct statements of the fact that I have met with is contained in the following communication, for which I am indebted to Miss Pinchard, an accomplished naturalist of Torquay:—

"I have myself been repeatedly so affected by their clinging to the back of my hand as to have the skin mottled, and so tender as to induce me to refrain from willingly coming in contact with them. On one occasion the whole of the back of the hand and fingers was covered with white blisters, as if I had thrust it into a bed of nettles, and nearly as painful. The affection did not last above an hour or two, and only occurred when the *Antheas* had become flaccid and feeble, as they often do after a short captivity. I have never found any effect arise from handling them when they were in an active and healthy state."

Mr. Dana attributes to the kindred species, *A. flagellifera*, a power of making its terrors known even at a distance. "Having a number of *Monodontas* [a genus of univalve *Mollusca* allied to our *Trochi*] too much crowded in a large jar of water, I took out half-a-dozen and placed them in a jar with the *Actinia*. On looking at them about three hours after, I found that, instead of climbing like the others to the top of the water, they remained just where they had fallen, closely withdrawn into their shells. Supposing them dead, they were taken out, when they directly began to emerge; and when returned to the jar with the other *Monodontas*, they were all in less than five minutes clustered round its mouth. On placing them again in the jar with the *Actinia*, though kept there for two hours, they did not once show themselves out of the shell. Once more placing them along with the other shells, they exhibited their former signs of life and activity. The experiment was repeated several times with a large *Littorina*, with the same result, evincing fear of the *Actinia* on the part of the Mollusks."*

I can only say that *Trochus umbilicatus*, *Littorina littorea*, and *Chiton fasciculatus* have no such fear of *Anthea cereus*; for I have just seen these crawl without hesitation by the side of a full-grown and vigorous specimen.

Though sensible pain or irritation does not invariably follow the contact of the human skin with the tentacles of *Anthea*, yet their strong power of adhesion is never lacking. Dissection reveals the cause of both, in the unwonted profusion with which these organs are furnished with *cnidæ*. In the outer of the two layers of which the tentacle-wall is composed reside the *cnidæ*, excessively numerous and thickly crowded; of two kinds, chambered and spiral. But it is in the crimson tips that the *cnidæ* exist in the most prodigious profusion. They completely fill the field of the microscope, when a portion of the wall, flattened by the compressorium, is under view, without the least space free of them, not even a line or a point; but overlying each other like herrings in a barrel, yet maintaining a general uniformity of direction.

Within the cnidiferous layer, there is another of pigment cells, visible to the naked eye as a dark brown or nearly black lining, which can be readily pressed out from a wound in the tentacle. These granules are very regularly globular, of a translucent golden-brown hue by transmitted light, varying in diameter from ·0003 to ·0004 inch, and are arranged in bead-like rows running transversely. This pigment-layer does not give the green hue to the tentacle; for it may be entirely scraped away, leaving the interior surface of the tentacle-wall of the same opaque emerald-green hue as the exterior.

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* Zoophytes, p. 126.

This green tint does not appear to be dependent on pigment, but on the arrangement of the primary molecules of the sarcode; for when pressed to flatness, it yields no transmitted colour, except a *very slight* yellowish tinge which has no distinct location. It presses to a viscid glaire, full of amorphous refracting granules, and *cnidæ.* The tip exhibits similar phenomena, but the diffused tinge is faintly purple.

The larger *Eolides* tear away and devour the tentacles of *Anthea:* but I know not of any other animal that can venture on attacking it with impunity. I one day saw an amusing example of its power of passive resistance. A beautiful little specimen of the variety *Alabastrina*, which had been sent me by Mr. Gatehouse, I had occasion to remove from one tank to another. There was a half-grown Bullhead (*Cottus bubalis*) at the bottom, which had been in captivity rather more than a fortnight. As he had not been fed during that time, I presume he was somewhat sharp-set. He marked the *Anthea* falling, and before it could reach the bottom, opened his cavern of a mouth and sucked in the *bonne bouche.* It was not to his taste, however; for as instantly he shot it out again. Not discouraged, he returned to the attack, and once more sucked it in, but with no better success; for, after a moment's rolling of the morsel around his mouth, out it shot once more;

and now the Bullhead, acknowledging his master, turned tail, and darted into a hole on the opposite side of the tank in manifest discomfiture. But if you, my gentle reader, be disposed for exploits in gastronomy, do not be alarmed at the Bullhead's failure: only take the precaution to "cook your hare." Risso calls this species "*edulis*," and says of it,—"*On le mange en friture*," and I can say "*probatum est*." No squeamishness of stomach prevents our volatile friends, the French, from appreciating its excellence; for the dish called *Rustegna*, which is a great favourite in Provence, is mainly prepared from *Anthea cereus*. I would not dare to say that an Opelet is as good as an Omelet; but *chacun à son goût;* try for yourselves. The dish is readily achieved.

The species not unfrequently increases by spontaneous division. I have elsewhere* given the details of a case of this sort; since the publication of which I have received from various correspondents accounts of the same phenomenon. The fission begins at the margin of the disk, and gradually extends across and downward, until the separation is complete, when each moiety soon closes and forms a perfect animal. It is, perhaps, only another phase of the same tendency, that the tentacles are frequently forked.

Anthea cereus has been observed in the following British localities:—

Jersey, *G. G.:* Guernsey, *E. W. H. H.:* Herm, *S. W.:* Ventnor, *G. G.:* Weymouth, *P. H. G.:* Lyme Regis, *J. G.:* Dawlish, *R. C. J.:* Teignmouth, *R. C. J.:* Torquay, *P. H. G.:* Falmouth, *W. P. C.:* Fowey, *C. W. P.:* Penzance, *R. Q. C.:* Scilly, *G. H. L.:* Ilfracombe, *P. H. G.:* Tenby, *P. H. G.:* Holyhead, *E. L. W.:* Man, *F. H. W.:* Cumbrae, *D. R.:* Oban, *J. C. G.:* Ballyholme Bay, *W. T.:* Newcastle (Co. Down), *W. T.:* Portrush, *E. P. W.:* Dublin

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* **Tenby, a Seaside Holiday, p. 373.**

Bay, *E. P. W.:* Carnsore Point, *E. P. W.:* Clew Bay, *W. T.*

A. Couchii.
A. dianthus. CEREUS. A. mesembryanthemum.
[flagellifera.]
[A. flava.]
B. Tuediæ.
[— ? pustulata.]

The curious little *Actinopsis flava* of MM. Danielssen and Koren,[*] which appears to be a near ally of this genus, is remarkable for having the two gonidial tubercles greatly prolonged into semicylinders, and terminating in two points. It closely resembles in other respects a small *Anthea*, and is of a yellow hue. As it has occurred in deep water (250 fathoms) off the southern end of Norway, it may reasonably be looked for on the opposite coast of Scotland, and in the Shetland Seas.

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[*] Fauna Litt. Norveg. ii. 89.

FAMILY IV.—ACTINIADÆ.

The species of this family, though very few in number, are well marked by the single character of being furnished with those peculiar organs which M. Milne-Edwards calls (not very felicitously) *bourses chromatophores*, or *tubercules calicinaux*, and which I have named marginal spherules. These are hollow spherical vesicles, with thin walls, situated near the edge of the disk, on the inner side of a sharp margin, and outside the exterior row of tentacles. For the most part, if not always, these organs are of bright or vivid colours, generally differing from those of the other parts; and hence they are conspicuous, and impart a peculiar aspect to the physiognomy.

What function in the economy of the animal is performed by these bead-like spherules is as yet unknown, though that they play some important part can scarcely be doubted. In our *Actinia mesembryanthemum*, I have ascertained that the walls are almost wholly composed of *cnidæ*, of nearly linear form, and about ·0025 inch in length. The inclosed thread is with difficulty seen, both before and after extrusion; it is, however, of considerable length. From this structure I have conjectured that the marginal spherules in this family may represent—functionally, not homologically—the *acontia* of the *Sagartiadæ*, which are here wanting.

Sir John Dalyell has an extraordinary observation to the effect that each of these spherules " is pierced by an orifice, which opens and dilates occasionally, some time after the animal has fed."[*] This fact, however, if fact it be, is confirmed by no other observer that I am aware of.

The integuments of the column seem to be imperforate: this is certainly the case in the genus *Actinia;* and in *Phymactis*, though the evidence is of a negative character, there is no reason to believe that it is otherwise. The character of the surface varies according to two very distinct types. In *Actinia* it is remarkably smooth, soft, and fine; in *Phymactis* it is roughened with strong and coarse warts. These diversities manifest the osculant position of the group; for while the former genus shows a close affinity with the *Antheadæ*, the latter takes no less firm a hold upon the *Bunodidæ*. It is interesting to find an exotic species (the *A. primula* of Drayton[†]) with marginal spherules and a smooth skin, which emits long filaments from the *mouth*. Here, then, we have the representative of the *Sagartiadæ*.

As regards Geographical Distribution, the Family is extensively spread; the two principal genera representing it respectively in the northern and southern hemispheres. *Actinia* ranges from the Red Sea, through the Mediterranean, over the western coasts of Europe, and the isles of the North Atlantic. *Phymactis* is widely distributed over the shores of both sides of the South Pacific, and of the South Atlantic, reaching a little way north of the Equator, being represented by no less than three species at the Cape de Verd Isles, where, it is curious to observe, it meets with the beautiful representatives of the northern form,—*Actinia tabella*, and *A. graminea* of Dana.

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[*] Rare Anim. of Scotl.; 203.

[†] Dana, Zooph. 134: pl. ii. figs. 12—15. At least it is thus represented in one of Mr. Dana's beautiful figures, though no allusion is made to the peculiarity in the text. M. Milne-Edwards has made of it his genus *Nemactis*, but with a wholly gratuitous assumption of characters.

ANALYSIS OF THE GENERA.

Skin smooth.	
Possessing acontia (*Not British*)	*Nemactis.*
Destitute of acontia	*Actinia.*
Skin warted (*Not British*)	*Phymactis.*

GENUS I. ACTINIA (LINN.).

Entacmæa (EHRENBERG).

Base adhering to rocks; considerably exceeding diameter of column.

Column pillar-shaped, usually much wider than high; margin greatly developed, smooth, separated by a broad, but shallow fosse from the outer tentacles; a circle of vividly coloured spherules projecting from the inner surface of the wall of the fosse; surface delicately smooth, imperforate, non-adhesive; substance fleshy.

Disk greatly expanded and overarching; concave.

Tentacles in several rows; moderately long; nearly equal; unicolorous; wholly retractile.

Mouth set on a protrusile cone; two pairs of gonidial tubercles, brightly coloured.

We possess but a single British species, *A. mesembryanthemum.*

THE BEADLET.

Actinia mesembryanthemum.

Plate VI. *figs.* 1—7.

Specific Character. Colours of column not arranged in transverse zones.

Actinia equina.	Linn., Syst. Nat. 1088. Müller, Zool. Dan. Prod. 231. Milne-Edw., Corall. i. 238.
mesembryanthemum.	Ellis and Sol., Zooph. 4. Rapp, Polyp. 52; pl. ii. fig. 1. Grube, Actin. 10. Couch, Corn. Faun. iii. 74; pl. xiv. fig. 1. Johnston, Brit. Zooph. Ed. 2. i. 210; pl. xxxvi. figs. 1—3. Dalyell, Rare Anim. of Scotl. ii. 203; pl. xliii. and xlvii. fig. 1. Cocks, Rep. Cornw. Pol. Soc. 1851. 5. pl. i. figs. 7—11, 15. Gosse, Aquarium, pl. ii.: Tenby, 370: Linn. Trans. xxi. 274: Manual Mar. Zool. i. 30; fig. 43. Tugwell, Man. Sea-Anem. 52.
hemisphærica.	Pennant, Brit. Zool. iv. 104.
rufa.	Ibid. Ibid. iv. 105. Müller, Zool. Dan. i. 23; pl. xxiii. figs. 1—3. Lamarck, Anim. s. vert. iii. 67. Roget, Bridgew. Tr. i. 198; figs. 86, 87.
purpurea.	Cuvier, Tabl. élém. 653.
corallina.	Risso, L'Eur. Mér. v. 285.
margaritifera.	Templeton, Mag. Nat. Hist. ix. 304; fig. 50. Johnst. Br. Zooph. i. 213; fig. 46. Cocks, Rep. Cornw. Soc. 1851. 5.
Forskälli.	M-Edwards, Corall. 241.
cerasum.	Dalyell, Rare Anim. Scotl. ii. 219; pl. xlvi. fig. 1.
chiococca.	Cocks, Rep. Cornw. Soc. 1851. 5. pl. i. fig. 14. Johnst. Br. Zooph. i. 214; pl. xxxvi. figs. 4—6.
? *tabella.*	Dana, Zoophytes, 132; pl. ii. fig. 9.
fragacea.	Tugwell, Man. Sea-Anem. 53; pl. 5.
? *graminea.*	Dana, Zooph. 132; pl. ii. fig. 10.
Entacmæa mesembryanthemum et *E. rufa.*	Ehrenb. Corall. Roth. Meeres, 36.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; considerably exceeding the column, outline often long-oval.

Column. Delicately smooth, without much excretion of mucus, wholly imperforate, and non-adhesive. Substance fleshy, approaching to pulpy. Form hemispheric in button, a low column in flower, much expanded at the summit. Margin strongly developed, with a smooth, sharp edge, bounding a wide but shallow fosse, within which are seated a single series of numerous spherules.

Disk. Slightly concave, smooth; the radii faintly marked.

Tentacles. About two hundred in full-grown individuals, arranged in six rows thus:—6, 6, 12, 24, 48, 96 = 192; moderately slender, shorter than the diameter of the disk, sub-equal; flexuous, usually carried arching over the margin.

Mouth. Elevated on a blunt cone.

COLOUR.

Base. Edged with a narrow line of bright blue.
Column. Liver-brown.
Marginal Spherules. Brilliant azure.
Disk and Tentacles. Dull pellucid crimson.
Mouth. Rich crimson.
Gonidial Tubercles. Blue.

SIZE.

Large specimens sometimes cover with their base an area four inches long by two wide, attain a height of about an inch, and expand to a flower of three inches in diameter.

LOCALITY.

The Mediterranean and Atlantic shores of Europe, universally distributed, on exposed rocks, from half-tide, or even a higher level, to low-water mark.

VARIETIES.

The characteristic colours of the species are crimson and green. The extreme of variation on either hand is produced by either of these two colours prevailing so as to exclude the other. But many intermediate grades are found, either by the blending of the two hues into some intermediate tint of olive, brown, or liver-colour, or else by the separation of the two into a pattern of spots on a different ground, or, where the green hue exists alone, by a separation of its constituent elements, blue and yellow. We may distinguish the following varieties:—

α. *Hepatica.* The liver-brown condition above described, which is the most common (fig. 2).

* Approaching the red.

β. *Rubra.* Column dark crimson; disk and tentacles as before. In youth this and the following variety are of a pellucid light crimson (fig. 5).

γ. *Chiococca.* Column rich scarlet; basal line flesh-colour or non-apparent; disk and tentacles full crimson; spherules pure white (fig. 7, labelled *A. chiococca*). The *A. Forskälli* of the Red Sea, the *A. cerasum* of the Scottish Coast, the *A. chiococca* of St. Ives and other parts of Cornwall, must be considered as belonging to this variety; nor can I separate from it the *A. tabella* of the Cape Verd Isles, except that this approaches the var. β.

** Approaching the green.

δ. *Umbrina.* Column, disk, and tentacles, a yellowish umber-brown; spherules (as in all the following) azure; basal line (as in all of this section) blue (fig. 3).

ε. *Ochracea.* Column, disk, and tentacles orange-buff.

ζ. *Olivacea.* Dark olive.

η. *Glauca.* Pellucid bluish green; tentacles pale greenish blue (fig. 1).

θ. *Prasina.* Fine leek-green; tentacles the same, pellucid.

*** Colours interrupted.

ι. *Opora.* Leek-green, with longitudinal broken lines of light green or pure yellow; spherules and basal line blue (fig. 4).

κ. *Tigrina.* Red, streaked with yellow (TUGWELL).

λ. *Fragacea.* Liver-coloured, or dark red, studded with numerous spots of light green; no basal line. Attains a very large size (fig. 6).

The most marked of the above varieties is undoubtedly the last,—the Strawberry, as it is familiarly named. Its constancy of colour and pattern, its tendency to an ovate form, and its great size, distinguish it from its fellows; and yet I cannot, after much consideration of the subject, in the presence of the animals themselves, convince myself that it is entitled to specific distinction. I have found specimens in which the spots were small and crowded, others in which they were large and scattered, others in which they were small and scattered; sometimes the spots are portions of lines irregularly interrupted, and not seldom considerable regions of the surface are quite destitute of spots. The marginal spherules are sometimes large, sometimes minute; now azure, then pearly white. A more marked character is the absence of the coloured line bounding the base; but I am not sure that this is constant.

I am glad to fortify my own opinion by that of so acute an observer as Mr. Holdsworth. He writes me as follows:—"I have now seen so many connecting links between the typical *mesembryanthemum* and the *fragacea*, so called, that I am convinced they are one and the same species; although I have not arrived at this conclusion without devoting considerable time and attention to the subject."

Of the supposed species, *chiococca*, *cerasum*, and *Forskälli*, for these are assuredly all the same thing, I would speak with some deference, owing to my having never seen the form in its perfect type, though I have no doubt of its identity with the present subject. Sir John Dalyell, though he gave it a specific name, summed up his observations with the following words:—"On the whole, I am disposed to view it as a variety of *mesembryanthemum*." Nor do I see how he could do otherwise; for he tells us that, of his *cerasum*, which was very prolific, all the young were red *but one*, which, red at first, became at five months old *pale green*. This bred, *and all its progeny were green;* though it had upwards of a hundred descendants before it was two years old, and continued to breed for five years more.

It is but fair, however, to add, that Mr. W. P. Cocks, who constituted *chiococca* a species, and to whom I am indebted for the beautiful drawing which I have copied in my Plate VI. fig. 7, retains his opinion. From one of his letters to me, I cite the following interesting notes:—"The *A. chiococca* is certainly a good species. I have never found it associated with the *A. mesembryanthemum*, and rarely more than one or two in the same locality (though explored by me in Cornwall), with one exception. On the under surface of some very large stones used for making a pier near the north-western extremity of the town of St. Ives, I found several colonies of the interesting creatures in full health, enjoying the blessings of freedom in a nook not often disturbed by anything but the rough and boisterous waves from the North Channel. About twenty feet from this spot, and nearer high-water mark, the under surfaces of the stones forming a portion of this abortive construction were covered with old and young members of the beautiful varieties of the *A. mesembryanthemum*, dark bottle-green with yellow dots, dark green with yellow stripes, claret with yellow spots, yellowish green, light ochre, amber, scarlet, &c. The blue beaded rim and blue fillet at base were displayed by each member of this group. A specimen of the *A. chiococca*, which I had in confinement for more than twelve months in my experimental jar, furnished me with a batch of young ones,—all were true to colour and markings." This, however, can by no means outweigh the positive evidence on the other side furnished by Sir J. Dalyell.

Nor can the *A. margaritifera* of Templeton be allowed any higher rank. The flattened, rigid, corrugated condition on which he relied for a specific character, I have not unfrequently seen in individuals, which, in the course of an hour or two, were swollen out to the softness and plumpness normal to the species. Mr. Cocks comes to my aid here with an interesting narrative of two specimens which he found in a condition exactly corresponding to Mr. Templeton's description of *margaritifera*. He was at once convinced that sickness was the cause of their peculiar flatness and attenuation, and the shrivelled tesselated character of their skin. He treated them accordingly, and in a few days they assumed the usual plump condition.

Facts seem to show that even the same individual is liable to considerable change of colour. Mr. Cocks tells me that from some hundreds of experiments he has ascertained that "the colour is materially changed by diet, good or bad; by water, pure or impure; by attention or neglect; by over-feeding or starvation." And Mr. E. L. Williams, jun. has favoured me with still more precise statements on this very species. He observes:—"*A. mesembryanthemum* does change. Bright green in two months has got to dark olive in my tank; bright amber to dark brown; brown with vertical yellow spots or dots has lost these markings."

Characteristic as are the marginal spherules, they are subject to some irregularities. I found a large specimen of the deep olive variety, which had on the *exterior* of the margin two azure tubercles;—one of them round, well defined, and in no respect distinguishable from the intramarginal spherules,—the other somewhat less so. Below these, scattered down the side of the column, were four or five more blue warts; more irregular in form and shape, but still well defined, and perfectly similar in their azure hue to the spherules. I subsequently obtained a second specimen with exactly the same peculiarities. On the other hand, a specimen of the same variety—which was sent me from Cumbrae by Mr. D. Robertson about six months ago, and is still in my possession—has never showed the slightest trace of spherules, though in every other respect perfectly normal; the basal line and the gonidial tubercles being of the usual azure hue.* It is by no means unusual to see examples of the red varieties, in which the spherules are pale red,—the blue pigment being defective.

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* "M. Haime has remarked that these *bourses chromatophores*, or calycine tubercles, are to the number of 18 in those individuals which have not yet developed the tentacles of the 5th cycle; of 24 in those which have 5 or 5½ cycles, and of 48 in those which have 6 cycles com-

The name *Actinia*, originally applied to the whole race of Sea-Anemones, is derived from *ἀκτὶν*, a ray; the specific appellation, *mesembryanthemum*, is the name of the fig-marigold, so called from its opening at noon, (*μεσημβρία*, = *μέσος*, *ἡμέρα*, mid-day): the term *beadlet* alludes to the marginal beads.

As no species is more abundant, nor more easily procured than this, since it affects the most exposed rocks, and does not seek the protection of hollows, so none is more easily reconciled to captivity, and few are more beautiful. It requires no special treatment; a surface for the support of its base, and water sufficient to cover it, are enough; nor is it essential to its existence that the latter should be very pure, for it will continue to drag on life when its fellows have died out. Yet few species more immediately resent negligence of this kind, or more gratefully express their appreciation of a pure and limpid element. Widely as the species is distributed in a state of freedom, we scarcely ever see it except where the water is habitually clear. It is a curious fact, for which I am indebted to Mr. E. L. Williams, jun., that "the Mersey estuary is the only place on our coasts in which he has not found this species;" which he attributes to the foulness of the water. This absence would be less remarkable, were it not that *Tealia crassicornis* is abundant there; but *Actinia* is clean and *Tealia* is dirty in its habits. In the

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plete; that is to say, in the large individuals where 192 tentacles or thereabouts may be counted. He has recognised also that these pouches communicate directly with the sub-tentacular chambers of the first cycles; and that they contain little muscular fibre, but carry navicular thread-cells of various forms, and of which the interior thread is indistinct, together with transparent vesicles, and pigment-globules."—MILNE-EDWARDS, *Hist. Corallaires*, i. 240.

neighbouring estuary of the Dee, the former is common, as usual.

With ordinary attention the pretty Beadlet will attain a good old age in captivity. A veteran, whose portrait is given by Sir John Dalyell, had lived in his possession twenty years (in 1848), and was judged to be not less than seven years old when he obtained it. At Sir John's death the specimen passed into the hands of Professor Fleming, and it was not many months ago that I heard of it as still surviving. If it is alive now, it must be approaching forty years old. This individual was the prolific parent of 334 children. A second specimen had lived about fourteen years under the worthy baronet's care.

The species is generally viviparous, producing abundantly; but sometimes it gives birth to ciliated, shapeless embryos, on which tentacles appear in about ten days. Copious details of high interest on the embryology and general economy of this Anemone are furnished in the magnificent volumes of the eminent Scottish naturalist.

It is superfluous to give a list of habitats for this species: since it occurs all round the coasts of England, Wales, Scotland, and Ireland, wherever there is rock enough to afford it standing ground.

The *Actinia Cari* of Della Chiaje (the *A. concentrica* of Risso) appears to be a second species of the genus; at least in none of the recognised varieties of ours do we perceive an approach to the pattern of colouring,—a series of concentric zones or bands,—by which *that* is marked.

A. cereus.
MESEMBRYANTHEMUM.
[Nemactis.] [Phymactis.]
Actinoloba. Bunodes.

FAMILY V.—BUNODIDÆ.

I propose to include in this family all those species, the surface of whose column is studded with persistent tubercles, and which are not provided with marginal spherules, nor with perforations of the integument. In some instances, certainly,—perhaps in all,—these excrescences have the faculty of adhering with force to foreign bodies; and thus they agree in function with the suckers of many of the *Sagartiadæ;* there is this difference, however, that whereas in those, the margins of the suckers do not rise above the general level when inactive, in these the tubercles are always well developed, and are particularly prominent in those species in which the adhesive function, if it exists at all, is feeble and rarely exercised.

The integuments and muscular coats appear to have a much greater density than in any of the previous families, and the movements of the animals manifest a higher degree of vigour, and even of intelligence. The tentacles are generally short, thick, and conical.

The typical and sub-typical genera—*Bunodes* and *Tealia*—appear to be represented by species which are scattered over the seas of the world, and are for the most part littoral: the genera *Cystactis* and *Echinactis* are confined to the southern hemisphere: and the aberrant genera, *Bolocera*, *Hormathia*, and *Stomphia*, inhabit the deep water of the British and Norwegian seas.

ANALYSIS OF THE GENERA.

- Tubercles conspicuous.
  - Disk and tentacles retractile.
    - Tubercles of one kind only.
      - In the form of rounded warts.
        - Irregularly scattered . . . . *Tealia.*
        - Arranged in vertical lines . . . . *Bunodes.*
        - Arranged in many horizontal lines (*Not British*) . . . . "*A. fusco-rubra.*"
        - Arranged in a single horizontal line . *Hormathia.*
      - In the form of pointed blisters (*Not British*) *Cystactis.*
    - Tubercles of two kinds, viz. rounded warts and erectile pointed papillæ (*Not British*) . . *Echinactis.*
  - Disk and tentacles not retractile . . . . *Bolocera.*
- Tubercles obsolete . . . . *Stomphia.*

GENUS I. BOLOCERA (GOSSE).

Anthea (JOHNSTON).

Base adherent: not much exceeding the column.

Column pillar-like, the diameter and height subequal. Surface generally very smooth, studded with small warts, remotely scattered. Substance "fibro-cartilaginous" (*W. P. C.*).

Disk smooth, circular in outline, not overlapping the column.

Tentacles short, thick, constricted at foot, obtusely pointed, longitudinally furrowed; flexuous and motile; easily separated; not retractile.

Mouth not raised on a cone; stomach capable of being greatly protruded.

There is but a single known species, *B. Tuediæ*.

THE DEEPLET.

Bolocera Tuediæ.

PLATE V. *fig.* 1.

Specific Character. Body dull red; tentacles chestnut.

Actinia Tuediæ. JOHNSTON, Mag. Nat. Hist. v. 163; fig. 58.
Anthea Tuediæ. IBID., Brit. Zooph. Ed. 2.; i. 242, fig. 53. LANDSBOROUGH, Scott. Chr. Her. 1840, 243. COCKS, Rep. Cornw. Pol. Soc. 1851, 11; pl. ii. fig. 33. GOSSE, Ann. N. H.; Ser. 3. i. 416.

GENERAL DESCRIPTION.

FORM.

Base. Adherent, scarcely exceeding the column.

Column. Cylindrical, smooth and as if polished on the general surface, but studded, somewhat sparsely, with minute rounded warts, which are scarcely apparent when the animal is extended, but, on contraction, "resemble the heads of small pins in a pincushion" (*W. P. C.*); in this condition the smooth surface is thrown into transverse wrinkles. Substance firm and sub-cartilaginous.

Disk. Flat, smooth, without conspicuous radii; outline circular, not exceeding the column.

Tentacles. Numerous, in three rows, close-set; the innermost remote from the mouth, sometimes two inches in length, and half an inch in diameter; the other rows diminishing in gradation; stout, constricted at the foot, then swollen, and tapering to an obtuse point, which is perforate; marked with longitudinal *sulci*, which are obliterated when the tentacle is completely distended; very flexuous and motile; readily detached, and retaining their irritability and worm-like motions long after the separation. They cannot be retracted within the column, nor are they capable of any considerable elongation or contraction.

Mouth. Not raised on a cone. Lip apparently not thickened. Stomach-wall capable of being protruded in the form of great bladder-like lobes.

COLOUR.

Column. An uniform deep flesh-colour, reddish, or brownish-orange.

Disk. A lighter tinge of the same.

Tentacles. Chestnut or reddish flesh-colour.

Stomach. When protruded, reddish with paler lines.

SIZE.

Three or four inches in height, and from five to eight inches in diameter, when expanded.

LOCALITY.

Deep water off rocky coasts, from fifty to two hundred fathoms.

It will be evident from the above-mentioned characters that this form must be considered as generically distinct from *Anthea*. It is, in fact, intermediate between that genus and *Tealia ;* with a preponderance, however, of the features proper to the latter, which has induced me to assign it to this family. In this judgment I carry the concurrence of Mr. W. P. Cocks, who has enjoyed more opportunities of studying it in life than any other naturalist; and to whom I am indebted for the carefully coloured drawing which embellishes my Plate V. as well as for some interesting notes.

Notwithstanding its great size, and somewhat inelegant form, Mr. Cocks calls it "a charming creature;" and says on another occasion, "this is certainly a beautiful animal when healthy and half-grown; though the queer movements of the peristome and lobed mouth, pouting like an old man with negro lips and toothless jaws, at once pronounce its relationship with *crassicornis.*"

It is essentially a deep water species: Messrs. Danielssen and Koren ascribe it to the coralline zone off the coast of Norway, from thirty to fifty fathoms, and, on the authority of Mr. Sars, mention it as ranging to the amazing depth of two hundred fathoms.* On the Cornish coast, it is not seldom found among trawl-refuse;† and Dr. Johnston tells us that in Berwick Bay it occasionally occurs attached to the deep-sea lines of the fishermen. "I have often found," he remarks, "the tentacula in a separated state adhering to their lines; and, as these retain their irritability and motion for a long time, they are apt to be mistaken for independent and perfect worms, which they much resemble."*

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* **Fauna Litt. Norv. ii. 87.**

† **Cocks in litt.**

I have seized so unusual a peculiarity as the ready parting with the tentacles, to create a generic appellation,—*Bolocera*, from *βάλλω*, to cast, and *κέρας*, the horn. The word *Tuediæ* was applied to the species by Dr. Johnston, because Tuedia was the ancient name of the maritime parts of Berwickshire. The English term I have formed in allusion to its habits.

With the exception of some extraordinarily gigantic specimens of *A. dianthus*, this is the largest of British Anemones. The following are its recorded localities.

Peterhead, *C. W. P:* Berwick Bay, *G. J.:* Cullercoats, *J. A.:* Falmouth, *W. P. C.:* Cumbrae, *D. L.*

A. cereus.

TUEDIÆ.

T. crassicornis.

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* Br. Zooph. i. 243.

GENUS II. BUNODES (GOSSE).

Actinia (ELLIS).
Cribrina (EHRENBERG).

Base exceeding the column; its outline generally undulate.

Column pillar-like; the height in extension considerably exceeding the diameter. Surface studded with permanent rounded warts, set in vertical lines, which are separated by bands of plane skin. Margin denticulate. Substance firmly fleshy.

Disk flat, circular in outline; scarcely overlapping the column. Radii conspicuously marked.

Tentacles not very numerous, arranged in several rows, submarginal; moderately long and slender, obtusely pointed, smooth, not very flexuous; marked (in the more typical species) with irregular white spots on the front face; perfectly retractile.

Mouth not raised on a cone; stomach not habitually protruded: gonidial tubercles generally conspicuous.

ANALYSIS OF BRITISH SPECIES.

Warts generally distributed.	
Warts large and small in alternate lines	*gemmacea.*
Warts subequal.	
Warts vertically remote, unicolorous	*thallia.*
Warts vertically contiguous, red-spotted	*Ballii.*
Warts only on upper half of column	*coronata.*

THE GEM PIMPLET.

Bunodes gemmacea.

PLATE IV. *figs.* 2, 3.

Specific Character. Alternate series of large and small warts. Column grey or flesh-coloured, with six equidistant bands of white. Tentacles thick, marked with white oval spots.

Actinia gemmacea.	ELLIS and SOLANDER, Zooph. 3. JOHNST. Brit. Zooph. Ed. 2, i. 223; pl. xxxviii. figs. 6—9. COCKS, Rep. Cornw. Soc. 1851. 7; pl. i. figs. 24, 25, 28. GOSSE, Dev. Coast, 168; pl. viii. figs. 1—4.
verrucosa.	PENNANT, Brit. Zool. iv. 103. LAMARCK, Anim. s. vert. iii. 70. RAPP, Polyp. 50.
? glandulosa.	RAPP, Polyp. 52.
Cribrina verrucosa.	EHRENB. Corall. 40.
Cereus gemmaceus.	M.-EDWARDS, Corall. i. 265, pl. C 1, fig. 3.
Bunodes gemmacea.	GOSSE, Tr. Linn. Soc. xxi. 274; Ann. Nat. Hist. Ser. 3. i. 417; Manual Mar. Zool. i. 29.

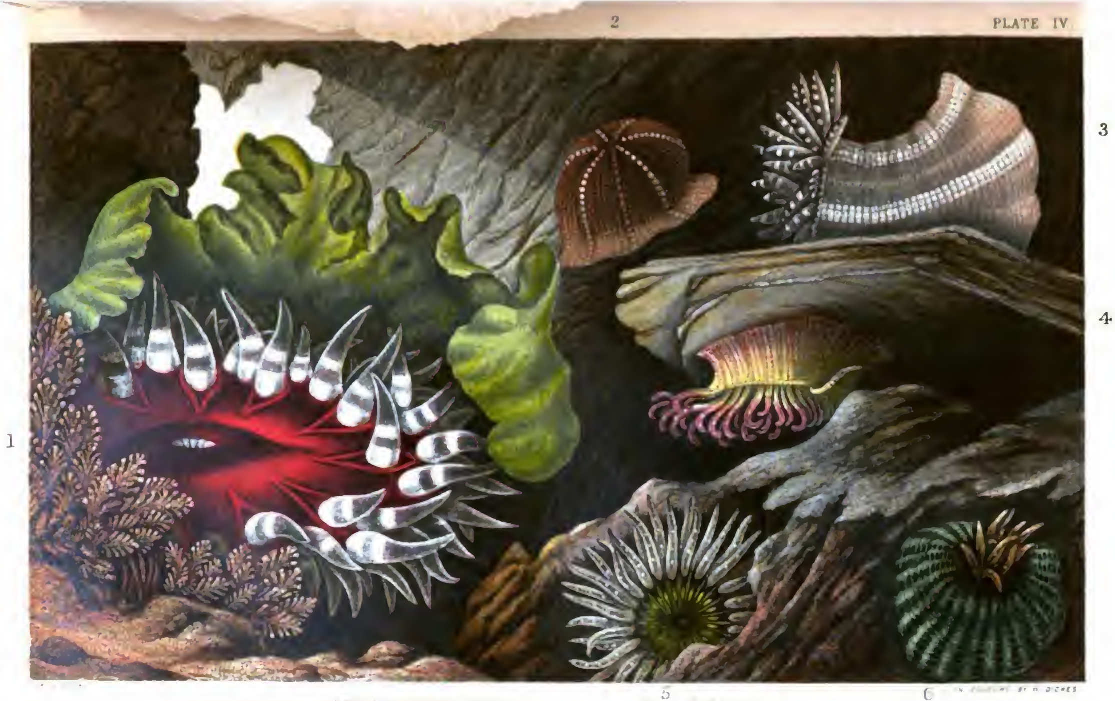
GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; in general but slightly exceeding the column.

Column. Pillar-like, rising to a height twice the diameter. Surface covered with round warts, arranged in forty-eight vertical rows, according to the following arrangement:—six primary rows equidistant, distinguished by their white colour, and by their superior size; six secondary rows, intermediate; twelve tertiary, intercalated between the primary and secondary;—the difference in size between these is slight, but is often discernible; finally a row of quaternary warts (twenty-four in all) is placed between all the above, and these are much smaller and less distinct. All these become indistinct towards the base, being traceable downwards in the ratio of their order; while towards the summit they become larger and bladder-like, the uppermost individuals of all the series crowning the

PLATE IV



In Colours by W. Dickes

1 TEALIA CRASSICORNIS
2 3 BUNODES GEMMACEA
4 B. BALLII
5 6 B. THALLIA

margin like serried teeth. In contraction the surface is thrown into transverse wrinkles, which of course pass *between*, and not *across*, the warts, and thus a latticed or decussate appearance is communicated;—as if each wart were the centre of a little square.

Disk. Flat or slightly concave; the outline circular and plane, a little overlapping. Gonidial radii strongly developed.

Tentacles. In four rows, containing 6, 6, 12, 24 = 48; corresponding to the lines of warts. They are sub-marginal, thick, moderately long, conical, obtuse; decreasing in size from the first row outwards; and are generally carried arching over the margin, or bent into a double curve, like the branches of a candlestick: often, however, they assume a clumsy, thickset form, swollen in the middle (see fig. 3).

Mouth. Raised on a blunt cone. Lip furrowed. Gonidial tubercles prominent.

COLOUR.

Column. Rose-pink, varying in brilliance, and often becoming brownish towards the summit. Primary warts white, making conspicuous longitudinal bands, which in the button state form a beautiful radiating pattern. Secondary and tertiary warts bluish- or reddish-grey, the former generally paler. Quaternary warts generally indistinguishable from the ground colour. Sometimes, however, the quaternary row which bounds each primary on each side is also white (see fig. 3).

Disk. Ground colour bluish-grey on the outer region, blending into a fine yellow-green around the mouth: each radius is bounded by a scarlet line, lost at about half-disk; the primary radii are often marked with darker and paler portions, sometimes even black and white; and the result is a brilliant kaleidoscopic star, of varied hues, the blue and scarlet lines in particular running out among the tentacles.

Tentacles. Pellucid grey or whitish, the front face olive, undefined, and deepening into black in the median line, often with a purple reflection: this face is crossed by about half-a-dozen large transversely-oval spots of opaque white, occasionally interchanged with more narrow and even linear ones. These spots are well-defined, and, though they vary in the tentacles of the same individuals, are never wanting.

Mouth. Lip whitish: gonidial tubercles grey, each marked with a central dot of bright rose-colour.

TENTACLE
(*lateral view*).

SIZE.

Rarely exceeding an inch in diameter, and an inch and a half or two inches in height.

LOCALITY.

The south-western and southern shores of England and Ireland; the coasts of Portugal, and of the Mediterranean: on exposed rocks and shallow pools between tide-marks.

VARIETY.

The species is but little subject to variation of form, or of hue, except within the limits mentioned above. Specimens differ a good deal, however, in the intensity and brilliance of the tints.

The Gem was first discovered, or at least distinctly described, just a century ago, by Gaertner, who found it on the shores of Cornwall; but it was not till fifteen years afterwards that it received a name. Pennant then called it *Actinia verrucosa;* but this appellation has yielded to that of *A. gemmacea*, which was conferred upon it by Ellis and Solander, and which has been so generally adopted by British zoologists, that it would be pedantic to attempt to restore the original name. Both epithets are appropriate. Pennant's (signifying *warty*) is, however, rather generic than specific; while Ellis's, if somewhat more vague, is well fitted to suggest the delicate beauty of this pretty little species,—perhaps unrivalled, among British species, for its *painting*. The English term by which I designate the genus, alludes to the *pimples*, or warts, with which the animals are studded.

It is essentially a littoral species. I am not aware that it has ever been brought up from deep water, nor does it much affect the concealment of holes or crevices. The surfaces of stones, and shallow pools within tide-marks, are the stations it habitually prefers, and it is often found in the latter even when they are but little below the level of high water. It appears to be gregarious; for, though we do not find individuals crowded together, as is the habit of *bellis*, a dozen or twenty are often seen occupying the shallow basins of an area of rock a yard or two in extent, though none are to be seen beyond this. In the button-state, the radiating bands of white on the reddish-grey ground, with the globular form, give a *primâ facie* resemblance to an Echinus, denuded of its spines, which is very striking. In their native pools the specimens are often partially enveloped in gravel, from which, if closed, their six-fold star appears prettily conspicuous; while if expanded, the brilliant pencilled disk, and white-spotted tentacles, are even more attractive.

The Gem is detached with ease, and becomes reconciled to captivity without difficulty, where it preserves its characteristic habit of stationing itself on some exposed spot, whence it is little given to wander.

It is prolific, bringing forth living and well-formed young, which are produced one, two, or three in twenty-four hours, and not scores or hundreds in a night, as are those of *S. bellis.* The Gem, however, will often continue to breed at this rate for weeks. The new-born young immediately attach themselves, and display the characteristic colour and markings: they have twelve tentacles; that is to say, the primary and secondary series are developed before birth. In this condition they greedily devour food when presented.

Miss Loddiges, of Hackney, who has been very successful in breeding and preserving this, as well as other species of Anemones, has favoured me with some particulars of her treatment, which may be useful to others. Speaking of the young, this lady observes:—"I feed them from their first appearance,—rather a delicate operation,—and they steadily grow, though rather slowly. . . . . Oyster seems the best food for them, but I give them lobster, and even meat. . . . I am satisfied sea-weed is not necessary in the tank: I have discarded it for some time, and only admit one small piece of red for an ornament. I syringe the water daily."

The voracity of the species I have already alluded to. From my friend Mr. F. H. West, I learn that it is even ot cannibal propensities. A *Sag. troglodytes*, var. ζ, he suddenly missed, and suspected *gemmacea* of murder. His suspicions were confirmed, for the lost wretch was disgorged in two portions, of which the first came away on the second day, the second and larger on the fourth. The result of digestion was manifest, in the squeezed and shapeless appearance of the masses, the dissolution of the interior, and the flaky sloughing of the exterior.

In the published descriptions, often imperfect and vague, of foreign species, we can sometimes find indications of probable affinities. The *Act. tuberculosa* of Bass's Strait (Quoy et Gaim.), *A. bicolor* of St. Vincent (Lesueur), *A. xanthogrammica* of Kamtchatka (Brandt), *A. cruentata* of Tierra del Fuego (Dana), and *A. Macloviana* of the Malouines (Lesson),—are doubtless true *Bunodes*, indicated not only by their warty surface, but also by the white spotting of their tentacles. Of these, the first two seem closely allied to our *gemmacea*, the third to *thallia*, while the last two deviate more from the type, and appear parallel with *Ballii*.

The following are the recognised British localities of the species:—Guernsey, *E. W. H. H.:* Jersey, *G. G.:* Weymouth, *W. T.* (w.): Torquay, *P. H. G.:* Paignton, *P. H. G.:* Falmouth, *W. P. C.:* Ilfracombe, *P. H. G.:* Douglas, *F. H. W.:* Youghal, *J. R. G.:* Cork, *J. R. G.:* Mizen Head, *E. P. W.:* Valentia, *J. M. Jones*.

GEMMACEA.
[tuberculosa].
[bicolor].
thallia.

THE GLAUCOUS PIMPLET.

Bunodes thallia.

Plate IV. *Figs.* 5, 6.

Specific Character. Warts sub-equal, vertically remote, unicolorous.

Bunodes thallia.	Gosse, Annals N. H. Ser. 2, xiv. 283 : Tenby, 361 ; pl. xxiii. fig. *c* : Linn. Trans. xxi. 274. Annals N. H. Ser. 3, i. 417.
Cereus Thalia.	Milne Edwards, Hist. Corall. i. 266.

GENERAL DESCRIPTION.

Form.

Base. Adherent to rocks ; considerably exceeding column.

Column. A rounded button in contraction, pillar-like in extension, rising to full twice the diameter. Surface covered with numerous (about thirty-six) vertical rows of sub equal prominent warts, which are separated, in moderate extension, both laterally and vertically, by interspaces of about equal width, in which the skin is irregularly corrugated. The warts are about twenty-five in each row, and reach from the base to the margin, which is serrated with the elongated topmost warts of all the rows. They are strongly adhesive, and are occasionally drawn out to the length of a line, before they yield their hold. Substance firmly fleshy.

Disk. Flat, or slightly concave ; radii indistinct.

Tentacles. Sub-marginal, set in four rows ; 6, 6, 12, 24 = 48 :—the first three rows are, however, so nearly equidistant from the centre that, on a cursory inspection, there appear but two rows altogether. They are sub-equal, thick, obtuse, about half as long as the diameter of the column ; and are commonly spread horizontally, or overarching outwards.

Mouth. Set on a prominent cone.

Colour.

Column. Pale bluish or greyish green, with dark warts.

Disk. A many-rayed star of yellow rays on a blackish ground, produced in the following manner. The radii are blackish, each marked with a central spindle-shaped line of yellow ; in the primary and secondary radii, the yellow mark is broader and near the mouth; in the others, it is more slender, longer, and reaches to the tentacular region.

TENTACLE
(*lateral view*).

Tentacles. Pellucid grey, with the front face olive, on which are scattered numerous spots of opaque white: these spots are generally roundish, or polyhedral, and large and small ones are crowded together.

Mouth. Blackish, with the gonidial tubercles of a more intense hue.

SIZE.

Button an inch and a quarter in diameter, elongating to a height of two inches; expanse of flower two inches.

LOCALITY.

Both sides of the Bristol Channel; rocks within tide-marks.

VARIETIES.

α. *Hygroxyla.* The green condition described above.

β. *Xeroxyla.* Column dingy brown, with slightly darker warts; disk of the same tint; marked as in α.

γ. *Caustoxyla.* Column reddish chocolate, with darker warts; disk dark olive; marked as in α; the central half sometimes white.

I first discovered this species at Lidstep, on the coast of Pembroke, in 1854, and described and figured it in "Tenby; a Seaside Holiday." Very little has been added to its recorded history since that time; not more than four specimens having occurred, so far as I am aware, to subsequent researches, all of which were obtained near Ilfracombe.

Though manifestly a rare species, I was so fortunate as to light upon a numerous colony at its discovery. About a dozen individuals of different sizes were associated in the dark angles and pools of a little insular rock exposed at spring-tide, that lies just off the cove called the Droch, near Lidstep. They were not troglodyte in habit, but adherent to the open rock, and therefore easily detached. The species seems social; clustering together in groups, mutually pressing each other's sides.

The habits of the Glaucous Pimplet in captivity are closely like those of the Gem. Like the latter, it expands under the stimulus of the light, rather than in darkness, indicating a habitually exposed mode of life. Like *gemmacea*, it frequently erects itself when closed, in the form of a pillar; and throws off successive rings of mucus from its body, which accumulate around its base, if not removed. The action of the waves would wash these away in a state of freedom; in a tank they should be detached by means of a stick or hair-pencil.

I have never seen the warts of *gemmacea* used as suckers; but in specimens of the present species, I observed this function exercised by them very signally; not in the way of attaching extraneous fragments to the body, like *S. bellis* and *T. crassicornis*, but in taking hold of a firm support, like *S. troglodytes*. The suckers of the column adhered with force to the side of the glass vessel, and by contraction were stretched as above described.

The specific name "*thallia*" (not *Thalia*, as M. Milne Edwards misquotes it) I adopted in allusion to the elongated form and glaucous colour, from *θαλλία*, an olive-shoot. The same idea recurs in the epithets which distinguish the varieties,—as if the glaucous, the dull brown, and the chocolate, were the twig as green, dry, and scorched.

It is possible that the immature specimens, found by Templeton in Belfast Lough, and named by him *Act. monile*,* were the young of this species; though they have been generally attributed to *gemmacea*.

gemmacea.
THALLIA.
[xanthogrammica].
[Artemisia].
T. crassicornis.

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* Loudon's Mag. N. H. ix. 303; fig. 49.

THE RED-SPECKED PIMPLET.

Bunodes Ballii.

PLATE IV. *Fig.* 4.

Specific Character. Warts sub-equal, vertically contiguous, red-spotted.

Actinia Ballii.	COCKS, Rep. Corn. Soc. 1849, 94; Ibid. 1851, 9; pl. ii. figs. 9, 17, 18.
clavata.	THOMPSON (W.), Zoologist, 1851, App. cxxvii. GOSSE, Ann. N. H. Ser. 2, vol. xii. 127. Aquarium, 35. TUGWELL, Man. Sea Anem. 100, pl. iv. JORDAN, Ann. N. H. Ser. 2, xv. 88.
Bunodes clavata.	GOSSE, Linn. Trans. xxi. 274. Ann. N. H. Ser. 3, i. 417.
Cereus clavata.	MILNE EDWARDS, Hist. Corall. i. 267.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; considerably exceeding the column; generally lengthened-ovate in outline.

Column. Low and broad, scarcely rising to a pillar-form. Surface covered with warts about equal in size, arranged in forty-eight longitudinal rows, of which the alternate rows are traceable from the margin only about half-way down the column; the warts are contiguous vertically, but the rows are separated laterally, by interspaces of equal width, of corrugated skin. The primary rows consist of about twenty-four warts, becoming indistinct towards the base; the uppermost individuals of all the rows crowning the margin as blunt teeth.

Disk. Flat; the outline nearly circular, often much overlapping the column. Radii distinct; gonidial radii broad and strongly marked.

Tentacles. Nearly marginal, set in five rows; 6, 6, 12, 24, 24 = 72: the first three rows nearly equidistant from the centre. They are longer and more slender than in *gemmacea,* conical, obtuse; decreasing in size from the first row outwards; and are usually carried horizontally spread, with a very constant tendency to curl upward at the tips.

Mouth. Raised on a cone; often gaping; throat membranous, protrusile: gonidial tubercles usually prominent, often inflated.

COLOUR.

Base. Red, sometimes rich crimson.

Column. Pale yellow: each wart crowned with a well-defined crimson speck, the interspaces irregularly freckled with crimson. In some instances, the pale yellow predominates on the upper half of the column, the crimson on the lower.

Disk. Pellucid-grey, covered or dusted with opaque white specks, varying in size and shape, as if sprinkled with flour.

TENTACLE
(*lateral view*).

Tentacles. Very pellucid, pale yellow, but some or all frequently tinged with a lovely rose-colour: always sprinkled, *on all sides*, with minute irregularly shaped specks of opaque white.

Mouth. Lip and gonidial tubercles sometimes crimson or rose-pink; but sometimes whitish or pale yellow.

SIZE.

Ordinary specimens are an inch in diameter and half an inch in height, with an expanse of two inches. Mr. Tugwell figures one two inches in diameter, and three in expanse; and Mr. Brodrick writes me that one, which has been in his possession nearly three years, measures, after feeding, *four inches* in expanse.

LOCALITY.

The southern and south-western shores of England; on the under surfaces of stones, and in crevices between tide-marks, and in deep water.

VARIETIES.

α. *Rosea.* The most lovely condition above described.

β. *Dealbata.* The roseate hue wanting; the tentacles cream white; in other respects as α.

γ. *Funesta.* Tentacles dark umber or wood-brown, with little translucency. Disk smoke-black. Both dusted with yellowish-white specks as usual. Column as α; but tinged with brown. Usually of large size.

δ. *Livida.* Tentacles and disk tinged in various degrees with bluish-grey or livid green, often in a sort of changeable lustre, like that of putrescent flesh; with the characteristic specks. Chiefly from deep water.

Mr. William Thompson, of Weymouth, described this species by the name of *Actinia clavata*, in the Appendix to the Zoologist for 1851. But Mr. W. P. Cocks had already described and figured, under the title of *A. Ballii*, the same species, in his admirable memoir "On the Actiniæ of Falmouth," which was read before the Cornwall Polytechnic Society, in the autumn of the same year. He had been acquainted with the species ever since 1847; and had published the name in the Society's Report for 1849. To Mr. Cocks's appellation, therefore, belongs the claim of priority; but even were it otherwise, Mr. Thompson's name must be rejected, not only because it had been previously* applied to another species, but, according to a canon which I have already had occasion to apply to one of my own names,† *because it conveys a false idea.* The name *clavata* originated in a misconception. In the single specimen known to Mr. Thompson at that time, he mistook the *curling* of the tips of the tentacles for a *clubbing*, whence the name "*clavata*"—clubbed. These organs have not the slightest tendency to such a form as the term implies. The name which I adopt was given, I believe, in honour of the late Robert Ball, LL.D., an eminent marine zoologist.

I found the species not uncommon at Weymouth in 1853, especially on the ledges that are exposed at the recess of the tide, under Byng Cliff. Its habit is to lurk in narrow fissures in the cavities of the under side of large flat stones, and not unfrequently in the deserted holes of *Pholas* or *Saxicava.* The disk is very wide and flat; and, as it is also very expansile, it spreads itself to a considerable distance around the margin of its hole. So essential is it to its comfort, however, that it should have a retirement, that if it be put into an aquarium, though it may at first affix itself to a flat stone or to the surface of a shell, it will creep away, by means of its base, till it find some loose stone, under which it will insinuate itself till it is quite concealed; or a narrow crevice, as between two contiguous stones, into which it may thrust its body. The variety *livida*, which is not rare in Weymouth Bay, in deep water, manifests the same habit, for it is usually found to have ensconced itself in one of the angular cells or chambers formed by the coral-like plates of *Eschara foliacea*, which afford retreat to so many and so various creatures.

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* M. Rathke had named *clavata* an Actinia, which he found on the coast of Norway, in 1843.

† See ante, p. 75.

A remarkable peculiarity of this species is the degree to which it becomes transparent by distension with water. The effect of this is not the general swelling of the body, as in *T. crassicornis*, which is remarkable for the same habit effected in another way, but a great dilatation of the disk and tentacles, which then expand to an extraordinary degree, becoming so diaphanous as to be almost destitute of colour, and showing with absolute clearness the *craspeda* in the intersepts of the visceral cavity.

The species is hardy in captivity, and the varieties α and β are very beautiful, especially the former. The variety γ has not unfrequently beguiled me, on a hasty examination, into the notion that *S. bellis* was before me; and I think that these two species form links by which the families *Bunodidæ* and *Sagartiadæ* are connected. There is also a remote affinity between this species and *Aipt. Couchii.*

My friend, Mr. F. H. West, has received *B. Ballii* from the French coast of the Channel. On our own side it ranges in tolerable abundance from the Hampshire coast to the Lizard, as the following list will indicate:—

Selsey; Ventnor, *G. G.:* Freshwater Bay, *F. N. B.:* Weymouth; Torquay, *P. H. G.:* Falmouth, *W. P. C.*

thallia.
Sag. bellis. Ballii. Aip. Couchii.
[cruentata].
[Macloviana].

THE DIADEM PIMPLET.

Bunodes coronata.

PLATE VII. *Fig.* 4.

Specific Character. Warts almost confined to upper half of column, in lines and irregularly scattered; sub-equal, small.

Bunodes coronata. GOSSE, Annals N. H. Ser. 3, ii. 194.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to shells, scarcely exceeding column.

Column. Cylindrical in expansion, much higher than wide; covered on the upper two-thirds with moderately numerous small warts, neither perforate nor excavate; they are arranged in twelve longitudinal rows, with irregularly scattered ones between; and are generally wanting towards the base. Skin between the warts smooth, and when distended having a satiny lustre. Whole column invested with a thin drab epidermis, deciduous in ragged shreds, but adhering pretty firmly. A distinct parapet, with a smooth sharp edge, but no appreciable fosse.

Disk. Circular, flat, but often protruded so as to be convex, or to form a low cone; radii distinct.

Tentacles. In five rows; 6, 6, 12, 24, 48=96. They are sub-marginal, the first row springing at about three-quarter radius; they are shorter than radius, diminishing outwardly, conical, sub-acute.

Mouth. Large, protrusile: lip sharp: throat evertile, coarsely furrowed.

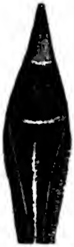
COLOUR.

Column. A rich orange, or orange-scarlet, with the warts either paler or darker than the ground-colour. Edge of parapet cream-white, immediately below which the margin is marked alternately with square patches of dark purplish chocolate, and narrower spaces of whitish (twelve marks of each colour in adults, six of each in young); these, from the fine contrasts of colour, when the button is not quite closed, have a very striking and characteristic effect, as if the animal were surmounted by an elegant coronet.

Disk. Red, varying from pellucid scarlet to a reddish chocolate; each radius bearing a longitudinal central streak of white, which does not reach either tentacle or lip, and bounded by a very fine white line on each side; thus is produced a pattern of fine radiating lines of white on red. Sometimes the lines are irregularly blotched and dilated, with ragged edges.

Tentacles. Pellucid, nearly colourless, crossed by three dim sub-opaque white bars, of which the middle one is most distinct; near the base are two chocolate bars, generally divided by a central longitudinal line of pellucid white, giving the appearance of four dark spots set in square. Sometimes one bar is nearly or quite obliterated.

Mouth. Lip whitish. Throat rich orange-scarlet; the furrows darker than the ridges.



TENTACLE (*front view*).

SIZE.

Diameter of column in button, one and a quarter inch; height two inches expanse of flower one inch.

LOCALITY.

The south coast of Devon; moderately deep water.

VARIETIES.

α. *Patricia.* The rich orange-scarlet condition just described.

β. *Plebeia.* The column of a dirty light brown; the markings of the marginal coronet distinct, but duller. The usually red ground of the disk replaced by deep brown, and the white lines by pellucid drab; the whole interrupted by four or five broad irregular radial bands of pure white. The bars of the tentacles obsolete.

This fine species first occurred to myself when dredging off Berry Head, in about twenty fathoms, in August, 1858. Three or four specimens came up in about the same number of hauls. In every case the animal was adherent to the shell of the living *Turritella terebra*, a mollusk which is so abundant there that the dredge comes up half-filled with it. The base of the *Bunodes* clasps the long turreted shell, nearly enveloping it when adult, only the apex and the mouth of the shell being exposed.

Other specimens have occurred since in similar circumstances; and Mr. Densham, a collector of Torquay, informs me that in October he obtained a group of eight or ten adhering to a mass of oysters.

It is manifest that this species departs considerably from the type of *Bunodes*. The irregularity of the warting, the conical form of the tentacles, and their style of colouring, in alternate undefined rings, and the occasional eversion of the walls of the throat, indicate a sensible approach to the following genus. It is always to aberrant species that we look for cross affinities; and therefore I was more gratified than surprised to see in this animal evident marks of connexion, both in appearance and habit, with the *Sagartiadæ*. Before I had seen it expand, I suspected it to be *S. parasitica*, especially when in the act of unfolding. It has much resemblance to that species, as well as to *S. coccinea*, with which it was associated; for a number of this little species occurred in the same dredge-hauls; these also adherent to the shells of the *Turritellæ*. The whole aspect of the Diadem Pimplet, including the colouring, is that of a *Sagartia*, though the preponderance of its characters determines it to *Bunodes*. It is interesting, in this relation, to notice, that one specimen in my possession protruded from the mouth a bundle of what appeared to be true *acontia*.

The species lives well in a tank; where it readily deserts its shell, and attaches itself to stones, or the vessel. It is lively, opening freely, frequently constricting its column, and changing its form with considerable rapidity; its vivacity and brilliant colour render it an acquisition to the aquarium.

Both the scientific and the English appellations by which I distinguish the species, allude to the coronet of purple spots which surround the margin.

Berry Head, *P. H. G.:* Torbay, *E. W. H. H.:* off Teignmouth, *G. H. King*.

Ballii.
Sag. parasitica. CORONATA. Sag. coccinea.
T. crassicornis.

GENUS III. TEALIA (GOSSE).

Actinia (LINN.).
Cribrina (EHRENB.).
Cereus (MILNE EDWARDS).
Bunodes (GOSSE).

Base exceeding the column.

Column not pillar-like; the diameter usually much exceeding the height. Surface studded with permanent rounded warts, which are hollow, and have a strong adhesive power, irregularly scattered, or not set in vertical lines. Margin denticulate. Substance cartilaginous.

Disk flat, circular in outline, considerably overlapping the column. Radii inconspicuous.

Tentacles not very numerous, arranged in several rows, sub-marginal; short, thick, and conical; unicolorous, or marked with undefined rings or bands of alternate colours; perfectly retractile.

Mouth raised on a cone; stomach habitually protruded to a great extent.

Muscular system highly developed; very dense, and of a cartilaginous firmness.

ANALYSIS OF BRITISH SPECIES.

Warts unequal: stomach and warts red; tentacles unbanded . . . . *digitata*.
Warts equal: stomach and warts grey; tentacles banded . *crassicornis*.

THE MARIGOLD WARTLET.

Tealia digitata.

PLATE VI. *Fig.* 10.

Specific Character. Warts unequal; stomach and warts red; tentacles not banded.

Actinia digitata.	MÜLLER, Zool. Dan. iv. 16; pl. cxxxiii. ALDER, Zooph. of Northumberland and Durham, 44.
Cereus digitatus.	MILNE EDWARDS, Corall. i. 272.
Tealia digitata.	GOSSE, Ann. Nat. Hist. Ser. 3, i. 417.

GENERAL DESCRIPTION.

FORM.

Base. Adhering to shells, often exceeding the column; outline undulate.

Column. Cylindrical, about as high as wide, sometimes dilated and overarching above. Margin smooth, parapeted. Surface studded with large warts, having a tendency to form transverse rows, but with no perpendicular arrangement. "A row of larger warts is usually found on the upper part, which, when the tentacles are withdrawn, form a tuberculated margin to the aperture." (J. A.)

Disk. Flat, often partly everted and overarching. Radii strongly marked.

Tentacles. Numerous, in three or four rows, stoutly conical, bluntly pointed, the first row largest, diminishing to the outmost, which are papillary: carried arching outwards.

Mouth. Throat evertile, strongly ribbed.

COLOUR.

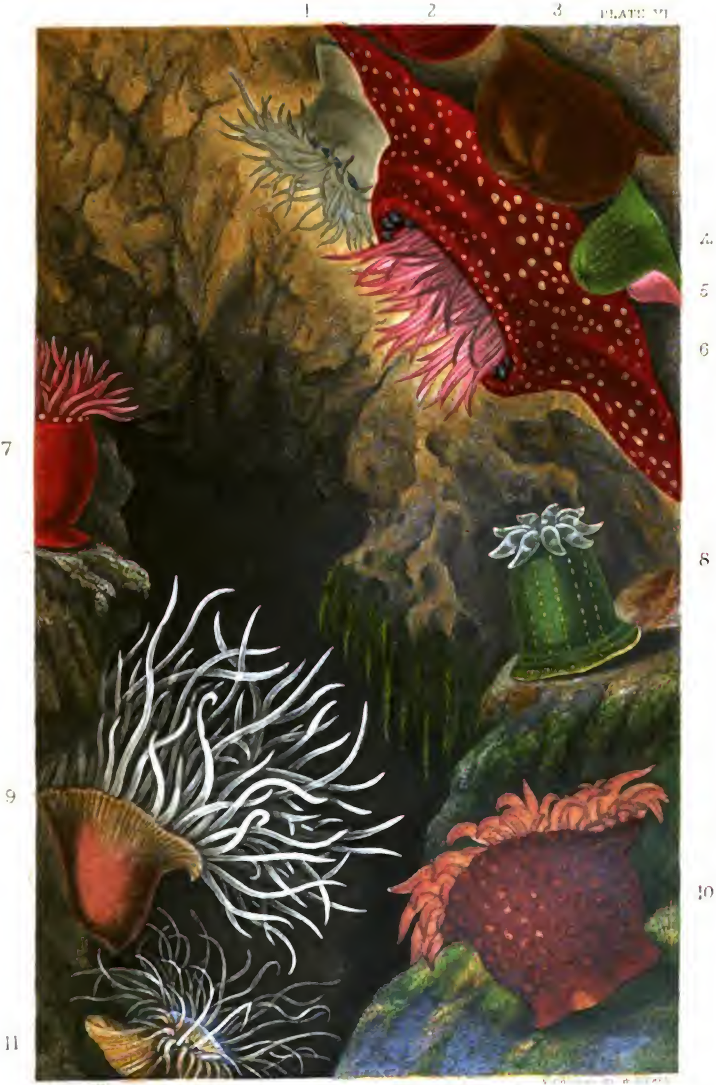
Column. Scarlet-orange, with paler warts.

Disk. Dull red.

Tentacles. Dull red, unbanded, a little deeper towards the tip.

Mouth. Ribs of throat brownish-orange.

PLATE VI



P. H. G. DEL.

1_6 ACTINIA MESEMBRYANTHEMUM
7 A. CHIOCOCCA
8 SAGARTIA CHRYSOSPLENIUM
9 ANTHEA CEREUS
10 TEALIA DIGITATA
11 SAGARTIA VIDUATA

SIZE.

Column one and a half inch high, and the same wide. Expanse about two inches.

LOCALITY.

Coast of Northumberland and Cornwall. Deep water.

The name by which I have distinguished this genus is given as a tribute to the skill and acumen of Mr. Thomas Pridgin Teale, of Leeds, who published an elaborate and excellent Memoir on the anatomy of the following species. The English appellation is sufficiently obvious. The specific term *digitata*, "fingered," doubtless alludes to the thick conical form and dull reddish hue of the tentacles, in which the Danish zoologist saw a resemblance to fingers,—those of a ploughman or a scullery-maid, surely!

I distinguish this species from *crassicornis* on the authority of Mr. Joshua Alder, of Newcastle, who first mentioned it as British, in his Catalogue of the Zoophytes of that coast. The same gentleman has kindly favoured me with several drawings of the species, executed with his well-known beauty and precision (one of which is reproduced in my Plate), as well as with his MS. notes, from all of which combined I have compiled the foregoing diagnosis. Mr. Alder entertains no doubt of its specific distinctness; and his numerous opportunities of seeing it alive and comparing it with the more common kind, render his opinion valuable. He says, "It is the most coriaceous and warty species that I am acquainted with." And again, "It is always much smaller than *crassicornis*, more tough and coriaceous, with larger warts, and constantly of a pale red colour."

"It is not uncommon," adds the same excellent naturalist, "in deep water on our coast; and as the cod-fishing boats are coming into port frequently at this season [April], I may be able to get you a specimen, though not in a lively condition."

Among the numerous drawings of Actinoïds for which I am indebted to Mr. W. P. Cocks, there are two which he has not named, but which are evidently identical with the Northumbrian species. Thus I am able to assign it to the Cornish coast. These are the only British localities I yet know for it.

DIGITATA.
crassicornis.

THE DAHLIA WARTLET.

Tealia crassicornis.

Plate IV. *Fig.* 1.

Specific Character. Warts equal; stomach and warts grey; tentacles generally banded.

Actinia felina et A. senilis.	Linn. Syst. Nat. 1088.
crassicornis.	Müller, Prod. Zool. Dan. 231. Fabr. Faun. Grœnl. 348. Johnston, Br. Zooph. i. 226; pl. xl. Gosse, Devonsh. Coast, 34. Cocks, Rep. Corn. Soc. 1851, 7; pl. ii. fig. 1.
Holsatica.	Müller, Zool. Dan. iv. 23, pl. cxxxix.
? fiscella.	Ibid. Ibid. iii. 3, pl. lxxxii. figs. 5, 6 (*juv. ?*).
? bimaculata.	Grube, Actinien, 4, fig. 4.
coriacea.	Cuvier, Tabl. élém. 653; Règne Anim. ed. 1, iv. 51. Rapp, Polypen, 51, pl. i. fig. 3. Teale, Trans. Leeds Soc. i. 91, pls. ix.—xi. Johnston, Br. Zooph. i. 224; pl. xxxix. figs. 1, 2. Cocks, Rep. Corn. Soc. 1851, 7; pl. ii. fig. 2. Tugwell, Man. Sea Anem. 54, pl. iii.
gemmacea.	Dalyell, Rem. Anim. Scotl. 223; pl. xlviii. figs. 1, 2. Johnst. Br. Zooph., Ed. i. 213. Couch, Corn. Fauna, iii. 76.
Cribrina coriacea.	Ehrenb. Corall. Roth. Meeres, 40.
Isacmæa papillosa.	Ibid. Ibid. 33.
Bunodes crassicornis.	Gosse, Trans. Linn. Soc. xxi. 274; Man. Mar. Zool. i. 29, fig. 42.
Tealia crassicornis.	Ibid. Ann. N. H. Ser. 3, i. 417.

GENERAL DESCRIPTION.

Form.

Base. Adherent to rocks and stones. In general not much exceeding the column.

Column. Rarely pillar-like. In expansion, the diameter greatly exceeding the height. Surface covered with small hollow adhesive warts, sometimes having a tendency to run in longitudinal lines, but more generally irregularly scattered, leaving intervals of three or four times their diameter in ordinary states of distension, and these intervals have often a silky lustre. Substance firm and even cartilaginous. Margin entire, but roughened with the scattered warts, forming a thick parapet, separated from the tentacles by a broad fosse. In freedom, the column is generally more or less disguised by fragments of stone and shell adhering to the suckers.

Disk. Flat, circular in outline, plane but overarching. Radii conspicuous chiefly by colour.

Tentacles. Arranged in five rows, the first set at about half radius,—5, 5, 10, 20, 40 = 80; the first and second so nearly equidistant from the centre as to seem but one. Their form is conical, thick at the foot, regularly tapering to a point, which is sometimes slightly inflated. The animals appear to have the power of changing the shape of these organs at will; for I have had individuals, in which the tentacles, after having for a while borne the ordinary conical form, suddenly became nearly cylindrical, with truncate extremities, and maintained this form for a long time. These organs are nearly equal among themselves, and their length is about equal to one-third of the diameter of the disk. They are capable of little flexure, and are generally spread in a regular star-like manner, the outer rows deflected, the inner erect, and the intermediate ones horizontal. They are powerfully adhesive.

Mouth. Frequently elevated on an eminence of varying form and dimensions. Throat and stomach often protruded to such an extent as to conceal the whole disk. Gonidial tubercles two pairs, small.

Colour.

Column. Dull green, streaked and flaked with crimson, with pale grey warts.

Disk. Glaucous-olive, with conspicuous radial bands proceeding from each outer tentacle, in pairs, which curve around the foot of each tentacle of the higher rows, and are lost at varying distances from the centre; those pairs which enclose the inner tentacles extend farthest and are most conspicuous. The colour of these bands is scarlet, often edged with white, and they are highly characteristic of the species.

Tentacles. Pellucid light brown, with a band of opaque white across the foot, which frequently stretches a little way up each side: a broad band of crimson surrounds the middle, bounded below, and sometimes above, by a narrower band of sub-opaque white. All these bands are undefined, and are often rendered sub-pellucid by distension.

Mouth. Generally tinged with crimson. Gonidial tubercles crimson. Throat and stomach light grey.

SIZE.

Diameter of column frequently three inches; expanse of flower five; height two. Specimens from deep water are occasionally much larger than this.

LOCALITY.

The Atlantic coasts of Europe, universally distributed; in tide-pools, and crevices and angles of rocks, near low-water mark; and in deep water. I am not certain whether it extends to the Mediterranean.

VARIETIES.

The colours of this species are very sportive, and scarcely two specimens can be found exactly alike; but all these modifications may be traced to different degrees of predominance of the hues above mentioned. This variety, from its resemblance to a streaked apple, may be named,—

α. *Meloides.*

β. *Purpurea.* Column wholly dull crimson; disk crimson, with the radial bands and sometimes the central region more brilliant than the rest. Tentacles pellucid crimson, with purplish bands.

γ. *Insignis.* As β, but the tentacles pellucid white, with broad and conspicuous bands of opaque white. (Pl. iv. fig. 1.)

δ. *Aurea.* Column yellow, from a light straw or brimstone colour to the hue of a ripe apricot.

ε. *Vilis.* All colour lost in a semi-pellucid dusky grey. (Deep-water specimens generally very large.)

In my "Devonshire Coast" (p. 36), I stated, with the reasons which led me to it, my firm conviction that what had hitherto been considered as two species, under the names of *A. crassicornis* and *A. coriacea*, were one and the same. Seven years' additional experience has only added to the strength of that conviction, and I have not been able to find a single stable character on which their separation could be grounded. It is equally clear which of the two specific names must stand. Rejecting Linnæus's as out of the question, we find that *crassicornis* was applied to the species by Müller, twenty-one years before Cuvier called it *coriacea.* With regard to significance, both appellations are good, perhaps equally good; the former indicating the thick horn-like form of the tentacles, the latter the tough and leathery consistence of the flesh. The law of priority, however, must be obeyed.

Scarcely less abundant than *Act. mesembryanthemum*, this magnificent species is sown broadcast upon all our shores, and seems everywhere to be equally common. In its habits, however, it is widely different from that favour-courting species. Somebody has illustrated the character of two peoples by saying, that if an Englishman retires from business and builds a box, he raises a high wall, and plants a shrubbery before it, to keep off the eye of the *profanum vulgus;* but a Frenchman under similar circumstances builds his house on the very edge of the highway, and takes his meals in the verandah. If this be true, the *Actinia* is a Frenchman, the *Tealia* an Englishman. You may hunt among the rocks till the rising tide covers them, and, finding hundreds of Beadlets, but not a single Dahlia, go away with the conviction, that the latter is a scarce species; but to-morrow, an initiated friend accompanies you to the same spot, and, pointing with his toe to an angle, says, " Here they are! and here! and here!—three, four, half-a-dozen in a group!" and you are tired of collecting before the profusion fails.

It is in the angles formed by some great boulder with the beach, that the *crassicornis* delights to dwell; and here, according to his recluse habits, he chooses to conceal his showy person from intruding eyes, by covering himself with a coat of gravel and fragments of shell, which he has attached to his adhesive suckers, till only the experienced eye can detect the difference between the animal and the surrounding rubbish.

Not seldom, however, do we meet with a colony in some persistent rock-pool, in whose never-ebbing fulness the gorgeous creatures remain almost permanently expanded, despising, or not needing, the precaution of concealment practised by their tide-deserted brethren of the beach. It is a remarkable example of the economy of creation, that these tide-pool specimens, as well as those which are brought up from deep water, rarely, if ever, indue their bodies with an extraneous covering.

In such pools *crassicornis* makes a noble appearance. His great size, the wide expanse of the flower, the thick tentacles so symmetrically disposed, and the rich hues often finely contrasted,—make it by far the most showy of our native species. By some of our fair collectors it has been named the *Dahlia;* a comparison which the size, symmetry, and varying hues of that favourite flower render not inapt. I have accordingly adopted it; designating the preceding orange-hued species by the appellation of the *Marigold.*

The resemblance has been acknowledged by one more conversant with flowers than even the ladies. "On one occasion," observes Mr. Jonathan Couch,* "while watching a specimen that was covered merely by a rim of water, a Bee, wandering near, darted through the water to the mouth of the animal, evidently mistaking the creature for a flower; and though it struggled a great deal to get free, was retained till it was drowned, and was then swallowed."

Mr. E. L. Williams, who has enjoyed unusual opportunities of acquaintance with the deep sea, writes me concerning this species as follows:—"When diving in bells at Dover, at the Admiralty Pier, in eight to ten fathoms' water, I have often seen it, generally on the tops or sides of lumps of rock. The Æsop Prawn [*Pandalus annulicornis?*] was very common there, and seemed its food. I never saw a closed *crassicornis* in deep water, except while catching its prey."

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* In Johnston's Brit. Zooph. i. 225; et in litt. priv.

My esteemed friend, Professor E. P. Wright, of Dublin, has favoured me with one of his vivid pictures, in which this species forms a prominent feature. It will be read with interest:—

"There is a very fine cave here, [Crookhaven, county Cork,] entered at either high or low water by a boat, whose entrance is guarded on both sides by a long low reef of rocks, and of a depth at low water of about ten or twelve feet. The sea-floor is shaped somewhat like a Spanish hulk, *i.e.* rather flat at the bottom, and then rising up gradually and 'wideningly' to a distance far above our heads, and then ending in an arch formed of sharp-pointed icicles of the by-me-never-to-be-forgotten Devonian slates. To this cave all the fat and fair anemones of the county seem to be sent, when once they have reached a good bodily condition. The cavern is of ample dimensions, so they don't crush each other for room; and the regular manner in which they dispose of themselves is worthy of note. *Actinia mesembryanthemum*—the green, scarlet, and strawberry varieties—occupied the highest row, some of them partly out of the water; they had eyes, and kept a 'look-out' for the rest. Then came *Sag. venusta* and *Sag. nivea*, lovingly intermixed, and in a large broad band some four feet deep. Then there came an empty row of benches, necessary to keep the tenants of the galleries from the aldermen in the pit, for it was *filled* with *T. crassicornis.* I verily believe the biggest of the big were here; and the commonest variety was the one with the *white* tentacles and *red* disk—a splendid show for size of specimens and magnificence of colour. This cave of Anemones never can be surpassed, and seldom will the wild grandeur of the cliffs, a hundred feet and more high, with the Atlantic waves rolling in to fill up the picture,—be equalled."

The voracity of this fine creature is remarkable. The

Shore-crab (*Carcinus*) is its ordinary prey, but it feeds on limpets, and other *Mollusca*. Dr. Johnston tells of one that had swallowed a valve of the Great Scallop, and of the strange result;* Dr. E. P. Wright had one which discharged as the remains of his evening's meal, "a moderate sized *Fusus*, and a mass of Nereids and Shrimps, that exhaled such a fearful smell as killed all my tank-full;" and one in Mr. F. H. West's possession actually made a *bonne bouche* of an *Echinus miliaris*, as large as a shilling, making no bones of the spines. Two days afterwards the shell of the Urchin was disgorged, perfectly empty, denuded of its spines, the oral plates crushed in, and partly wanting. The common Blenny and other fishes frequently fall victims to the rapacity of this gourmand, which spares not its own kindred.

The tentacles are very adhesive, as is sufficiently manifest to our fingers, when we touch them; and contact with these organs is amply sufficient to resist the most vigorous attempts to escape of the animals above-mentioned.

Beautiful as is the Dahlia, it is not a very frequent tenant of our aquariums; as it is one of the most difficult to keep. I have, however, kept specimens for four and five months; and Mr. West still longer; for the epicure whose urchin-diet is recorded above, had been then nine months in captivity. It appears to be little able to sustain extremes of temperature. The heat of summer is generally fatal to our captive specimens; and a severe winter makes havoc among those which are in the enjoyment of freedom. After the intense and protracted frost of February, 1855, the shores of South Devon were strewn with dead and dying Anemones, principally of this species, which were rolled helplessly on the beach, their bodies almost concealed by the protruding *craspeda*. This symptom is almost the invariable accompaniment of disease and death in *crassicornis;* these organs are present in unusual profusion, and are forced out at ruptures of the integument, by the contractions of the animal. The mesenteric membrane by which they are united to the septa is capable of great expansion: Sir John Dalyell has seen it protruded and spread up the side of a glass vessel, to the breadth of an inch. I have seen a similar phenomenon, but not quite to the same extent, in *Peachia hastata.*

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* Brit. Zooph. i. 235.

As in the case of *A. mesembryanthemum*, the ubiquity of this species renders a catalogue of its localities unnecessary: it is distributed everywhere on the British coasts.

Of foreign species, so far as may be conjectured from published figures and descriptions (often imperfect), the following may belong to this genus: *Artemisia* (Dana) from N.W. America; *pluvia* (Dana) from Peru; *gemma* (Dana) from Cape Verd Isles; *papillosa* and *ocellata* (Lesson) both from Peru; and *fusco-rubra* (Quoy et Gaim.) from the Tonga Isles. Of these the first-named seems intermediate between the present species and *B. thallia.*

		B. thallia.		
Anthea.		[Artemisia].		
	Bolocera.	CRASSICORNIS.		
	[Phymactis].	H. Margaritæ.	[Echinactis].	
Actinia.		St. Churchiæ.		[Cystiactis].
		Sagartia.		

TEALIA GREENEI (Wright).

Dr. E. P. Wright finds on the Irish coast a *Tealia,* which he thinks new, and for which he proposes the name of *T. Greenei.* The parapet is much smoother than in *crassicornis*, the tentacles much longer and more slender, the warts fewer and of a purplish hue. He has favoured me with a spirited drawing of it, but I cannot satisfy myself that it is anything more than *T. crassicornis*.

TEALIA TUBERCULATA (Cocks).

In the Report of the Cornwall Polytechnic Society for 1851, Mr. W. P. Cocks has described and figured a species, which he names *Actinia tuberculata*. "Body globular, light-brown, densely covered with large greyish-white tubercles, the apex of each tubercle depressed; disk white; mouth large; lips thick, corrugated, and everted; tentacula numerous, large, obtuse, some bifurcated, others trifurcated. Diameter three and a half inches when contracted." By private communication I learn further particulars. It was obtained thirteen miles south-west from Falmouth, attached to a valve of *Pecten maximus ;* it lived with Mr. Cocks for some months. "Bulky, rather loose in texture, when fully expanded covering the bottom of a large pan,—it had the appearance of a mammoth *bellis*. It appeared to be extremely irritable, and upon the slightest provocation would throw off from its body a large quantity of thick glaire, which, if allowed to remain, produced a disagreeable smell. When contracted it had the appearance of a half-boiled sago pudding."

I ventured to suggest that it might have been a great colourless deep-water specimen of *crassicornis;* but Mr. Cocks repudiates the identification, while he admits the relationship. The tendency of the tentacles to a monstrous fission seems to me its most marked peculiarity. It *may* be distinct.

GENUS IV. HORMATHIA (Gosse).

Base adherent; greatly expanded.

Column pillar-like, much corrugated, surrounded by a single horizontal row of warts.

Disk slightly concave; scarcely exceeding the column.

Tentacles moderately long and slender; perfectly retractile.

There is but a single known species, *H. Margaritæ*.

THE NECKLET.

Hormathia Margaritæ.

PLATE VIII. *Fig.* 1.

Specific Character. White, with purple tentacles.

Hormathia Margaritæ.	GOSSE, Annals Nat. Hist. Ser. 3, iii. 47.
? *Actinia nodosa.*	FABRICIUS, Faun. Grœnl. p. 350; No. 341.

GENERAL DESCRIPTION.

FORM.

Base. Very closely adherent to a living *Fusus antiquus;* far exceeding the column, and clasping the shell.

Column. Skin delicate, much corrugated transversely; below the margin a horizontal row of large well-defined warts, about ten in number; summit extremely corrugated, and falling into radiating folds in incipient retractation. A slight but distinct margin.

Disk. Slightly concave; outline almost circular.

Tentacles. Arranged in two or three rows, rather long, sub-equal, but the inner row somewhat longer than the outer; when fully expanded, curving over the margin.

Mouth. Not raised on a cone, slightly corrugated.

COLOUR.

Column. White.

Disk. White, streaked with very light brown.

Tentacles. Dark reddish purple, without any markings.

Mouth. Lip slightly yellow.

SIZE.

Diameter two inches; height two inches.

LOCALITY.

Moray Firth, near Banff; deep water.

For this magnificent species I am indebted to the kindness of the Rev. Walter Gregor, who obtained it in October last, from the lines of a deep-sea fishing-boat, and forwarded it to me. It was dead, however, when it reached me; but his own careful notes and sketches, made while it was alive, have enabled me, in combination with my own imperfect observations, to characterize it as above. As he had never seen another specimen, I can add no more particulars of its history.

The name of the genus I have formed from ὁρμαθὸς, a necklace of pearls, and the English appellation perpetuates the same allusion. The specific name is given at the discoverer's request, in honour of a lady, one of his most esteemed friends. The unsullied pearly whiteness of the animal, as well as its necklace, gives a peculiar propriety to this name,—*margarita* signifying *a pearl.*

The genus is aberrant in this family; the paucity of warts, and the soft and thin texture of the skin, departing manifestly from the typical forms. It approaches the *Sagartiadæ* through *Adamsia palliata* and *Sagartia parasitica*, with both of which it has obvious relations.

T. crassicornis.
MARGARITÆ.
Sag. parasitica. St. Churchiæ.
Ad. palliata. Sag. miniata.

GENUS V. STOMPHIA (Gosse).

Base adherent, expanded.

Column pillar-like; without warts or suckers, imperforate (?); skin much corrugated; substance not at all cartilaginous, but soft and lax.

Disk very protrusile.

Tentacles perfectly retractile.

Acontia not present.

Only one species has been yet recognised, *S. Churchiæ*.

THE GAPELET.

Stomphia Churchiæ.

PLATE VIII. *Fig.* 5.

Specific Character. Body dashed with scarlet on white or yellow; tentacles white, with scarlet bands.

Stomphia Churchiæ. GOSSE, Ann. Nat. Hist. Ser. 3, iii. 48.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks in deep water, expansile considerably beyond the column.

Column. Very protean in shape, generally a short thick pillar, sometimes constricted hour-glass fashion or like a dice-box; the base sometimes detaches itself, and becomes very concave with sharp edges, or, on the other hand, protrudes as a low cone. Skin much and irregularly corrugated transversely, and also longitudinally from the margin a little way downwards, thus giving a decussate appearance to the upper portion. Margin distinct, but without parapet or fosse, the outer tentacles springing from the very edge. Substance pulpy, or softly fleshy, very lax.

Disk. Flat, but often protruded as a low cone; radii well marked.

Tentacles. About 60, arranged in four rows, viz. 6, 6, 12, 36; sub-equal, the inner slightly longer than the outer, conical, much corrugated in contraction; when expanded, about equal in length to half the diameter of the disk; generally carried horizontally spreading, or descending with the tips slightly up-curving.

Mouth. Often widely opened. Lip sharp, protrusile, forming a narrow, low, circular wall.

COLOUR.

Column. Cream-white deepening to positive yellow, most irregularly sprinkled with dashes and streaks of rich scarlet, very much like a flaked carnation.

Disk. White or yellowish white, pellucid.

Tentacles. White or yellowish white, pellucid, marked with three remote rings of scarlet, and, on the lower half of their front face, with two parallel stripes of the same hue, running longitudinally to the foot, sometimes confluent throughout or in part. These lateral stripes vary much in distinctness and size even in the tentacles of the same individual; occasionally they run in upon the radii, and at times they are quite obsolete.

Mouth. Edge of lip rich scarlet, "like the nectary of the Hoop-petticoat Narcissus;" the colour sharply defined without, but within blending off quickly into the throat, which is white and strongly furrowed. Interior of gonidial tubercles scarlet.

SIZE.

Column. Two inches and a half in height, and the same in diameter; flower about three inches in expanse.

LOCALITY.

All round the Scottish coasts, in deep water.

VARIETIES.

α. *Lychnucha.* The condition just described.

β. *Incensa.* The red of the column predominant and almost wholly confluent, interrupted merely by a few yellow flakes.

γ. *Extincta.* Column and disk pure white; lip faintly tinged with red; tentacles having the usual scarlet bars and the scarlet foot-lines: the latter faint but distinct, and running in far upon the radii.

δ. *Pyriglotta.* Colours nearly as α; but remarkable for its large size, and the short thick-set form of the tentacles, which give it a considerable resemblance to *Tealia crassicornis.*

In the month of January, 1857, I was favoured with a communication from Miss Church of Glasgow, containing descriptions and figures of this showy and undescribed species, a specimen of which she had procured in Loch Long, in the previous summer. It had been brought up in the meshes of a turbot net. Its brilliant hues, and their flaked arrangement, the protean variability of its shape, and its vivacity, attracted her notice, as did also the fact that it discharged a multitude of globular ova, of the size of mustard-seed, and of a rich scarlet hue.

Last May, Mr. C. W. Peach, of Wick, sent me numerous sketches, some of which were coloured, of an Anemone which he had obtained at Peterhead, in April, 1850, and again in December, 1851; on each occasion from the hook of a fisherman's deep-sea line. These were manifestly identical with Miss Church's specimen.

It was not, however, until October, 1858, that I became, through the kind zeal of the Rev. W. Gregor, of Macduff, personally acquainted with this fine species. Within three months he has sent me, on different occasions, half-a-dozen individuals, including all the varieties distinguished above, which argues its variability of character. This gentleman has been familiar with it for several years, as a not uncommon inhabitant of the deep water of the Moray Frith. It is observable that all the specimens on record have been obtained by means of the deep-sea fishing boats.

The generic name I have formed from στόμφος, wide-mouthed; and the English appellation alludes to the same peculiarity, which is highly characteristic. The specific name is in honour of the kind correspondent to whom I am indebted for my first knowledge of the animal.

More aberrant even than *Hormathia* from the typical *Bunodidæ*, and about equally intermediate between this family and the *Sagartiadæ*, the genus might with equal propriety be placed in either. In its general aspect it rather inclines to the present family, especially by the intervention of *Hormathia*, with which it has much in common. I have not been able to find any *acontia*, but fragments of *craspeda* issue from ruptures in the skin, and have much the appearance of *acontia*.*

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* On two occasions I have seen protruded what looked like *acontia*. On one, it was very slender, streaming from the mouth to nearly an inch in length, so that I felt sure it was an *acontium*, till I put it under the microscope, when I found throughout the entire length, the ragged edge of the mesentery from which it had been torn. *It was but a craspedum.*

The Gapelet is rather difficult of domestication. In general, it attaches itself (usually to the perpendicular side of the vessel) for a short time, but soon relinquishes its hold, and, after rolling about a few days on the bottom, dies. The approach of death seems to be always symptomed by spontaneous rupture and sloughing of the skin, and protrusion of the viscera. One, however, of the variety *pyriglotta*, the gift of my kind friend, Mr. Gregor, established itself in my largest tank, and survived three months. My friend Mr. West has had a specimen from the Yorkshire coast a still longer time.

In health, *Stomphia* is remarkable for its extreme versatility of form. The column is sometimes cylindrical, sometimes shaped like a dice-box, sometimes like an hourglass, while frequently successive constrictions chase one another along the extent. The base, when the animal is free, is sometimes concave, at others convex, and occasionally conical, while not unfrequently these forms are combined, the centre being conical while the rest is concave, —a cone in a crater. The disk is sometimes a deep bell, like a Convolvulus; then a low cone, with the widely-gaping mouth crowning the summit.

My first consignment from Macduff consisted of two individuals, which on dissection proved to be of opposite sexes. They showed no external diversity of form or colour, but of one the pale salmon-coloured reproductive organs, which were very plump and full, were found under the compressorium to be filled with an infinite multitude of spermatozoa; each of which consisted of a long-oval body ·00015 inch in length, and a vibratile tail about thrice as long. In the other example the mesenteries were loaded with grape-like ova of a brilliant scarlet hue, varying in dimensions;—one of the largest measured ·03 inch in diameter. These consisted of an opaque scarlet yelk in a colourless chorion, which was perfectly globular, ·0027 inch in thickness. By flattening some, I could discern the segmentation at the edges, which appeared to be well-advanced. When ruptured, the yelk escaped from the larger ones,—a mass of oil-globules of various sizes.

The recognised localities of this species may be tabulated thus:—

Loch Long, *A. B. C.:* Peterhead, *C. W. P.:* Moray Frith, *W. G.:* Redcar, Scarborough, *D. F.*

T. crassicornis
H. Margaritæ
CHURCHIÆ.
Bolocera Sagartia.

STOMPHIA ? SPECTABILIS (Fabr.).

Mr. Gregor has a strong conviction that there exists, in the same locality, an Anemone closely allied to the above, in which the colours are blue and green, arranged in a flaked or splashed manner, like the scarlet and yellow of *S. Churchiæ.* This statement reminds me of the *Actinia spectabilis* of Greenland, which "has the body smooth, blue or green, striped longitudinally with rows of white points, and thick tentacles paler than the body, and spotted with white."* From the locality of this species, it would be not unlikely to occur on the northern coasts of Scotland.

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* Fabricius, Fauna Grœnl. p. 351, No. 342, *b.*

FAMILY VI.—ILYANTHIDÆ.

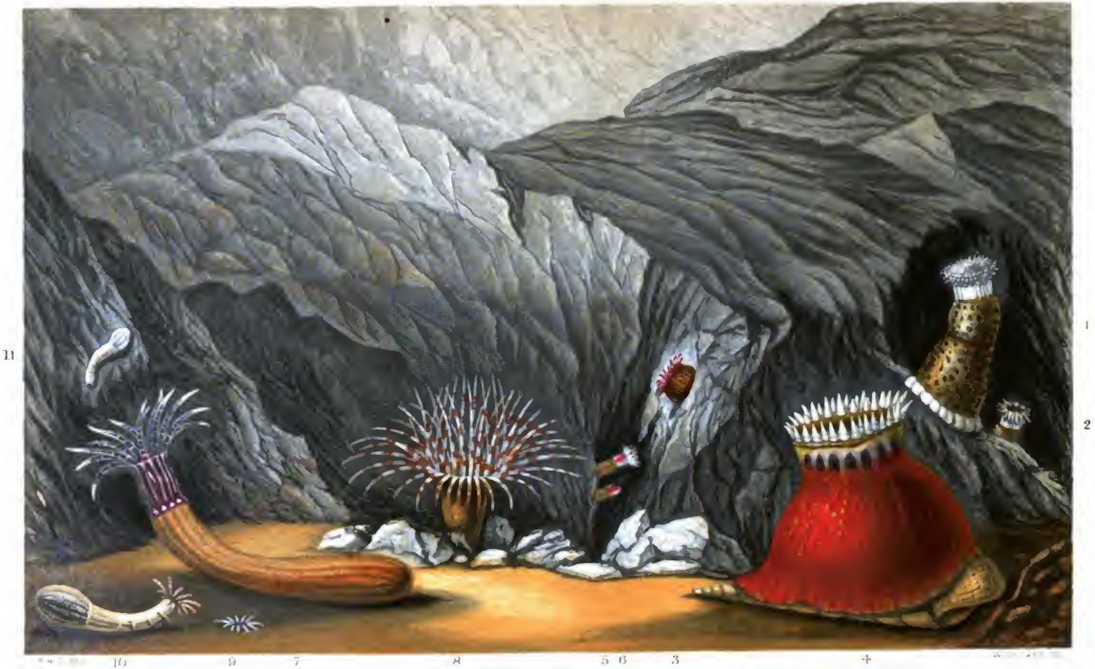
When Johnston published his second edition of the "British Zoophytes," a single Free Anemone alone was recognised: I shall have to include in the family at least a dozen, known to inhabit our seas, with two or three others as yet obscurely indicated; a number considerably greater than M. Milne Edwards assigns to the whole world, in his "Histoire Naturelle des Coralliaires," published little more than a year ago.

The *Ilyanthidæ* form a very natural group, readily distinguished by the important character, that they possess no adherent base; the column, which is generally lengthened, terminating below in a rounded, often more or less retractile, extremity. Hence they are *characteristically* unattached; but many of the species, perhaps all, possess an adherent power in the entire surface of the column, by means of which they can readily crawl over a solid body. Most of them inhabit tubes, which may be membranous and free, as in *Cerianthus;* membranous and investing epidermically, as in *Edwardsia;* or mere burrows in the sand or mud, as in *Halcampa*, *Peachia*, and *Ilyanthus*. Most of them have the habit of distending the hinder part of the column with water, assuming the form of a blown bladder.

A remarkably vigorous and spasmodic contractility in this family indicates a more intense muscular force, and points to a higher physiological rank, than the preceding families possess.

ANALYSIS OF THE GENERA.

- Tentacles of one kind, marginal.
  - Column thick, pear-shaped.
    - Mouth with a papillate gonidial tube . . . . . *Peachia.*
    - Mouth simple . . . . *Ilyanthus.*
  - Column slender, long, worm-shaped.
    - Invested with an epidermis . . . . *Edwardsia.*
    - Without an epidermis . . . . *Halcampa.*
- Tentacles of two kinds, marginal and gular.
  - Naked; freely swimming . . . . *Arachnactis.*
  - Dwelling in a membranous tube; sedentary.
    - Column inferiorly perforate . . . . *Cerianthus.*
    - Column inferiorly imperforate (*Not British*) . . *Saccanthus.*



1. PHELLIA GAUSAPATA.
2. P. MUROCINCTA.
3. GREGORIA FENESTRATA.
4. BUNODES CORONATA.
5. 6. EDWARDSIA CARNEA.
7. E. CALLIMORPHA.
8. CERIANTHUS LLOYDII.
9. 10. HALCAMPA CHRYSANTHELLUM.
11. H. [illegible]

GENUS I. ILYANTHUS (FORBES).

Column pear-shaped, tapering to a blunt point at the inferior extremity, which is probably perforated.[*] Surface smooth, without suckers, warts, or loopholes.

Tentacles of one kind only, marginal, numerous (*i. e.* exceeding thirty).

Mouth of the ordinary form, with no prominent gonidial development.

ANALYSIS OF BRITISH SPECIES.

Tentacles slender, filiform, long; lined	*Scoticus.*
Tentacles thick, conical, short; banded	*Mitchellii.*

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[*] There is no evidence on this point with respect to our two British species. Dr. Kelaart, in his "Description of Ceylon Zoophytes," speaking of a species, which he has done me the honour to name *Peachia Gossei*, but which is evidently an *Ilyanthus*, says that it has "an inferior orifice, large enough to admit a moderate sized probe, which gives passage to ova and excrementitious matter." (*Trans. Roy. Asiatic Soc.; Ceylon Branch.*)

THE SCOTTISH PEARLET.

Ilyanthus Scoticus.

Specific Character. Tentacles slender, filiform, long; marked with a dark line.

Iluanthos Scoticus. Forbes, Ann. N. H. Ser. 1. v. 183. pl. iii. figs. 2, 3. W. Thompson, Ann. N. H. Ser. 1. xv. 322. Johnston, Brit. Zooph. Ed. 2. i. 243. pl. xlv. figs. 1, 2. M. Edwards, Hist. Nat. des Coralliaires, i. 284.

Ilyanthus Scoticus. Gosse, Man. Mar. Zool. i. 30; Ann. N. H. Ser. 3. i. 417.

GENERAL DESCRIPTION.

Form.

Column. Pear-shaped, large above, tapering to a point at its lower extremity.

Disk. ("Mouth," Forbes; but probably the Disk is meant.) Round, and rather small.

Tentacles. Numerous (44, according to Forbes's figure), long (more than half as long as the body), slender, filiform, of nearly equal thickness throughout (apparently set in two or three rows).

Colour.

Column. Pink, with regular distant longitudinal white stripes.

Tentacles. Greenish, with a dark line down the middle of each; very nearly resembling those of Rapp's *Act. filiformis.*

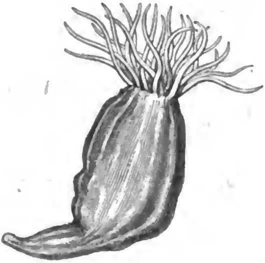
Size.

Length about an inch and a half.

Locality.

The west coast of Scotland, and the east of Ireland: deep water.

This genus was instituted by the late E. Forbes, to receive a "remarkable zoophyte," which he had dredged among *Corbulæ* and other inhabitants of mud, in four fathoms, in Loch Ryan, on the west coast of Scotland, in 1839. The name of the genus is formed from ἰλὺς, mud, and ἄνθος, a flower, and was originally written *Iluanthos;* but, as the Greek used in science is in a Latinized form, the correct orthography is certainly *Ilyanthus.* The English appellation refers to the pear-like form.



ILYANTHUS SCOTICUS
(*from Forbes*).

When we add that a specimen, presumed to be of this species, was found on the beach at Balbriggan, in Ireland, after a storm, in March, 1843, its whole known history is recorded.

———?	SCOTICUS.	S. viduata,
	Mitchellii.	

THE SCARLET PEARLET.

Ilyanthus Mitchellii.

PLATE VIII. *Fig.* 6.

Specific Character. Tentacles thick, conical, short, marked with transverse bands.

Iluanthos Mitchellii. GOSSE, Ann. N. H. Ser. 2. xii. 128. M. EDWARDS, Hist. Nat. des Corall. i. 284.

Ilyanthus Mitchellii. GOSSE, Man. Mar. Zool. i. 30, fig. 44; Ann. N. H Ser. 3. i. 418.

GENERAL DESCRIPTION.

FORM.

Column. Stout, somewhat pear-shaped, thickening from the summit for about three-fourths of an inch, whence it gradually tapers to a blunt point, "in the centre of which is a minute wrinkled disk, which the animal does not appear to use as an adhesive sucker." *

Disk. Very protrusile; not so wide as the body: radii distinct.

Tentacles. About 36, set in two complete rows; thick, short, conical, and usually curled. The bases of the two rows are in contact, but the outer is fully one-sixth of an inch from the margin, and the inner about as far from the base of the oral cone.

Mouth. Prominent, seated on a cone. Lip thick, coarsely furrowed.

COLOUR.

Column. Upper parts pale scarlet; lower two-thirds flesh-white, blotched with scarlet; lower extremity scarlet.

Disk. A ring of purplish-black surrounds the mouth, which is succeeded by a wider circle of white; and the remainder of the disk is pale red.

Tentacles. Pellucid white, marked on their front faces with numerous alternate bands of opaque white and purple, sometimes taking a diagonal direction. The tentacle that is opposite the mouth-angle on each side is wholly dull purple, with pale bands almost obsolescent.

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* I quote the words of my original description; but I suspect that this appearance was only the retractation of the terminal point.

Mouth. Lip rich scarlet.

SIZE.

Length about two inches; greatest diameter one inch.

LOCALITY.

The coast of Dorset; deep water.

This very fine species came into my possession in the spring of 1853, when I was engaged in collecting marine animals for the tanks of the Zoological Society of London. It was obtained by one of the Weymouth trawlers, who fish chiefly off the west side of Portland. As it remained with me but a few hours, and was then forwarded to its destination, the above description and the figure were all I could contribute to its history. The species has not been met with since.

I associated it with Forbes's *Ilyanthus* (naming it in honour of D. W. Mitchell, Esq. the Secretary of the Zoological Society); but it appears to approach nearer to *Peachia* than that species. Fuller observations are much needed on both.

Scoticus.
MITCHELLII.
P. hastata.

GENUS II. PEACHIA (GOSSE).

Siphonactinia (DAN. et KOR.).

Column cylindrical, pear-shaped, or swelling in the middle, rounded at the posterior extremity, where there is an orifice; margin entire, forming an indistinct parapet. Surface smooth, without loopholes, but studded in every part with very minute and very numerous suckers.

Disk flat, or very slightly conical, smooth.

Tentacles of one kind, twelve, thick, short, obtusely pointed; marginal; imperfectly retractile.

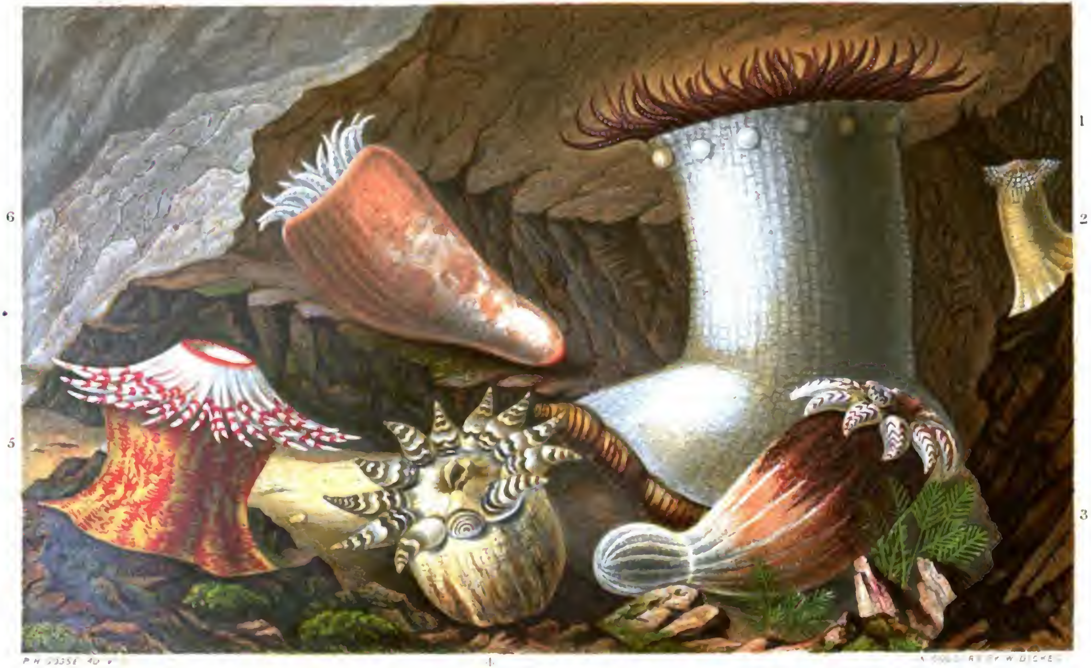
Mouth not elevated on a cone; lip thin, abrupt, protrusile, sometimes lobed. A single gonidial groove, the edges of which are soldered together so as to form a tube, which terminates above in a thickened, expanded rim (*conchula*), the margin of which is more or less divided.

Acontia wanting.

ANALYSIS OF BRITISH SPECIES.

Column lengthened.	
Conchula with from 12 to 20 lobes	***hastata.***
Conchula with 3 ovate lobes	***triphylla.***
Column short.	
Conchula with 5 shallow lobes	***undata.***

PLATE VIII



P. H. GOSSE AD V.   [illegible] W. DICKES

1. HORMATHIA MARGARITÆ.
2. PHELLIA BRODRICII.
3. PEACHIA HASTATA.
4. P. UNDATA.
5. STOMPHIA CHURCHIÆ.
6. ILYANTHUS MITCHELLII.

THE ARROW MUZZLET.

Peachia hastata.

PLATE VIII. *Fig.* 3.

Specific character. Column lengthened; conchula bearing from 12 to 20 lobes, which are mostly bifid; tentacles marked with arrow-heads.

Peachia hastata. GOSSE, Linn. Trans. xxi. 267, pl. xxviii.; Man. Mar. Zool. i. 31, fig. 46; Ann. N. H. Ser. 3. i. 418.

GENERAL DESCRIPTION.

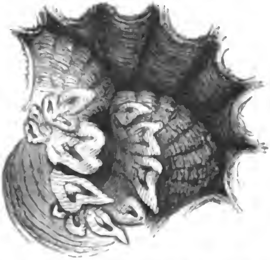
FORM.

Column. Club-, pear-, or spindle-shaped, or cylindrical, the same individual assuming all these forms; lower extremity rounded, with a minute central orifice, distinct, but generally closed, and apparently furnished with a sphincter. Surface smooth, but covered with microscopically minute suckers, which have the power of strong adhesion to foreign bodies. Substance fleshy, becoming more membranous below, where, when inflated, it resembles a blown bladder.

Disk. Flat, but protrusile, as a low cone; radii distinct.

Tentacles. Twelve, in one circle, marginal; short, thick, and somewhat flattened at the foot, tapering to a point; generally carried horizontally expanded; sometimes they are considerably lengthened and attenuated.

Mouth. Prominent, with a protrusile cushion-like lip, deeply furrowed.



CONCHULA AND MOUTH OF P. HASTATA (*magnified*).

Conchula. There is but one gonidial groove, the edges of which are united, the suture marked by a depressed line, on each side of which the wall is plump. The apical edge of the tube rises into a conspicuous organ (*conchula*), and is cut into papillary lobes, placed in single series, but generally so crowded as to overlap each other. They are from 12 to 20 in number, but are not perfectly regular either in form or order. Most of them are bifid; the back lobes have a tendency to be simple, except the central back one, which is large, and composed of two bifid ones united on a single stem; this compound one is generally bent over as a protection to the orifice of the gonidial tube. The papillæ resemble tentacles in that they are hollow, with thick walls, the internal surface of which is lined with brown pigment, deepening at the tips; they are very moveable.

COLOUR.

Column. Pale red or flesh-colour, through which the edges of the septa appear as twelve white lines: the fore half of the column is frequently marked with irregular splashes of chocolate-brown, which are sometimes confluent.

Disk. Pale red or buff, each radius marked with two Vs of deep brown, one within the other, the points of which are outwards; the point of the outer one meets the tentacle, and sends off a branch on each side, encompassing its foot.

Tentacles. Pellucid, each marked on its front face with arrow-heads of deep brown, arranged in two longitudinal rows, the points downwards: there are about six in each row, but near the tip they become indistinct. Each arrow-head is separated from its successor by one of opaque cream colour or pale sulphur-yellow.

Mouth. White, with the furrows deep brown.

Conchula. Pale salmon-colour; the lobes pellucid, with an opaque white core, which is crossed by a brown bar near the tip.

SIZE.

About four inches in length, and one in greatest diameter. I have seen the body lengthened to eight inches, without any signal attenuation.

LOCALITY.

Torbay, at extreme low water, and thence downward, buried in sand.

In a paper read before the Linnean Society on the 20th of March, 1855, I characterised this genus and species from specimens presented to me by the Rev. Charles Kingsley. I named it after Mr. Charles W. Peach, who was the discoverer of the first British Ilyanthidan known, which I at that time referred to the same genus. In June, 1856, MM. Danielssen and Koren founded, on a species occurring on the coast of Norway, their genus *Siphonactinia*, which is evidently identical with this, though they appear to have mistaken the conchula for the mouth.

The heavy easterly gales of last autumn, coinciding with the October spring tides, must have disturbed the *Peachiæ* in their burrows; for the species suddenly became common, as many as fifty having found their way into the possession of the Torquay dealers about that time. A few of these fell to my lot, and enabled me to correct and amplify the history of the species.

These specimens were very lively, ever bending their columns, and rapidly changing their forms. While under examination, they frequently adhered by various points of the column, and when lying on the side would, gradually but quickly, bring the hinder extremity round, under the body, nearly to the front, and then applying it to the bottom of the vessel, adhere, not by the orifice, but by the swollen surface around it. Constrictions were constantly passing along, commencing about the middle of the column, and passing off downwards, the effect of which was to throw out the translucent posterior extremity, like a clear distended bladder, within which the septa could be very distinctly defined.

One only of the specimens survived, the others I dissected. The former I put into a vase of sea-water with a bottom of sand. This was at night; in the morning it was just beginning to insert the hinder extremity into the sand, and thence the process of burrowing went on regularly. In two hours it elevated the fore parts, and assumed a perpendicular position, continuing to descend.* By eleven A.M. only about an inch in length of the fore parts remained above the level of the sand, when it expanded, and seemed satisfied. At night, however, it came out of its burrow, and remained wallowing on the surface; and for a week after this it continued to go in and out once or twice a day, grovelling and stretching awhile, and then burrowing comfortably almost to the tentacles.

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* Mr. Holdsworth, who obtained another of the Torquay specimens, has made an interesting observation on this process. "After it had selected a suitable place for burrowing, in the darkest part of the vase, the posterior extremity of the body became tapered to a fine point by a partial expulsion of the contained water, and at the same time turned downwards and pressed slightly into the ground; the fluid contents of the animal were then forced back until the base was completely distended, and by this means a shallow depression in the sand produced; the tail then resumed its conical shape, was again thrust into the ground, and swelled out; and these proceedings were continued until a hole was made sufficiently large to admit the animal. Its first efforts in burrowing had but little effect,

This individual still survives in the same vase, after six months' captivity; it frequently remains for days completely hidden, sometimes shows only the tips of the expanded tentacles, and rarely more than the disk, above the sand. It is perfectly domiciliated.

Another of the individuals referred to gave birth, while under my observation, to some half-dozen or more embryos, of oblong or ovate form, which appeared like little Peachias, but I could not see any trace of disk or tentacles in any. They were discharged one by one through the gonidial tube, as the animal lay on its side.

This one was ruptured in two places; and as it lay in a small tank, the craspedal mesenteries were protruded, and spread in large irregular areas on the glass bottom, perfectly flat and adherent, the membrane being pellucid and very delicate, and the craspedum bounding the outline like a white thread.

The conchula is generally protruded, even when the tentacles and disk are wholly retracted. Perhaps it is the seat of some sensation.

I. Mitchellii.
Halcampa. HASTATA. Cerianthus.
triphylla.
undata.

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and it was only after an hour's labour, when the cavity had become large enough to allow the polype to work in an upright position, and with the assistance of its whole weight, that rapid progress was made." (Annals N. H. for Jan. 1859, p. 78.)

THE WAVED MUZZLET.

Peachia undata.

PLATE VIII. *Fig.* 4.

Specific Character. Column cylindrical, short; conchula cut into five shallow lobes; tentacles crossed by dark wavy bands.

Peachia undata. GOSSE, Annals N. H. Ser. 3. i. 418.

GENERAL DESCRIPTION.

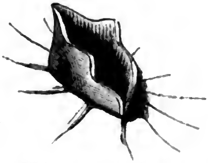
FORM.

Column. Cylindrical, rounded below, slightly fluted, about twice as long as the diameter of the disk; terminating below in a central perforate depression, around which the skin is much puckered, and minutely corrugated. Surface wrinkled, both transversely and longitudinally, especially when contracted. Margin distinctly angular, sometimes forming a very low parapet.

Disk. Smooth, flat, or rising with an even and very gentle elevation from the foot of the tentacles to the edge of the mouth; marked with twelve radii forming so many fine lines.

Tentacles. Twelve, in one circle, marginal; thick and rounded at foot, tapering regularly to the tip, which is obtusely pointed; transverse section sub-ovate, the diameter from side to side exceeding that from back to front. By irregular contraction, they sometimes become slender and cylindrical, often with the tip clubbed or knobbed. They are generally carried widely expanded horizontally, with the tips arching downwards, like a twelve-rayed star.

Mouth. Descends abruptly from the disk with a sharp angle, but which can scarcely be called a lip, as it is not thickened. It is protrusile at the will of the animal, when ordinarily it embraces the exserted gonidial groove, and displays a number of plicæ at its edge.



CONCHULA OF P. UNDATA (*magnified*).

Conchula. The groove is greatly developed; its edges are in contact until about one-sixth of an inch from the tip, where they separate, and turn over with a scroll-like expansion, the margin of which is cut into five shallow teeth, as follows:—one terminal and two lateral, all of which are bluntly triangular, or sub-square, two others still further removed from the terminal one, which are rounded and merge into the smooth descending edges. The mouth is sometimes widely retracted, and the groove exposed for the greater part of its length; but usually the conchula only is protruded from the almost closed mouth.

COLOUR.

Column. Very pale yellow, marked with irregular longitudinal splashes and stripes, of dull red, more or less confluent at the lower extremity. Margin pellucid, with alternating spots of opaque white.

Disk. Creamy white: each radius marked with a minute brown speck at the foot of each tentacle; except that radius which is opposite (not *correspondent*) to the gonidial groove, in which the speck is wanting.

Tentacles. White, crossed by seven waved bands of deep brown, each band strong and well defined at its upper edge, but ill defined and fainter at its lower edge: the fourth band (the central one) is broader and fainter than the rest. The lowest two bands are rather of a deep bluish-black. On the tentacle which corresponds to the groove, the lowest two bands are wanting, as are the lowest three on the tentacle opposite, leaving the face of this part of the tentacle pure white. The bands in all cases extend only across the front face and sides, disappearing on the back.

Mouth. Whole interior of throat and stomach, and exterior of the lower parts of the groove, a rich red buff or salmon-colour.

Conchula. Both without and within pure cream white.

SIZE.

Length about an inch and a quarter; diameter of disk about seven-eighths of an inch; expanded flower an inch and three-quarters; thickness of column one inch.

LOCALITY.

The Channel Islands.

The only individual of this species that I have seen was one which I owed to the kindness of my friend Dr. Hilton, of Guernsey, who obtained it on the island of Herm, lying on the sand at very low water, in April, 1858. When it arrived, after just thirty-six hours' confinement, it looked much exhausted, and lay flaccid, with the mouth very widely gaping, displaying the thickly folded stomach, of a salmon-buff hue, and the gonidial tube greatly exposed and protruded. The tentacles were collapsed. When put into sea-water, no immediate change appeared, but after an hour or two the tentacles began slowly to move one by one backward and forward, and slightly to swell and to lengthen, while the mouth partly contracted. Next morning it had quite recovered health and beauty.

The tentacles were very versatile, constantly changing their form. The mouth also was perpetually opening or closing, but slowly.

The animal appears unable to enclose the disk, but the tentacles contract individually, when touched, or spontaneously, shortening to mere warts. I have seen the animal when several of its tentacles could scarcely be distinguished from the general level of the disk-edge, except by the coloured rings.

It would lie rolling about on the sand in a vase, with constrictions successively passing up its body, and throwing off clear mucus. When put into a hole in the sand it would not remain; being very buoyant, it was soon on the surface, the hole gradually filling beneath it.

It remained in health for a few days, at which period the mouth gaped widely, and the lax corrugated stomach was exposed; the tentacles contracted to warts, and, the animal being manifestly feeble and dying, I dissected it.

Mr. Whitchurch, of Guernsey, reports having found a *Peachia,* which he supposes to be this species, on repeated occasions; it may, however, have been the following. He mentions the interesting fact that the tentacles are luminous.

The *Siphonactinia* (= *Peachia*) *Boeckii* has so close a resemblance to this species, that I am not certain whether my specific appellation will not have to be merged in that of the Norwegian zoologists. I rely, however, on the figure in Faun. Litt. Norv., ii., in which the lobes of the conchula are distinctly three in number, and are square in form. The manner in which the mouth is represented as pursed out, and closely investing the gonidial tube, with the gular furrows looking like rudimentary tentacles, I have observed both in this and the foregoing species. *P. Boeckii* is assigned to a depth of 80 to 200 fathoms in the fjords of Norway.

The posterior orifice in this genus cannot always be observed; I have, however, satisfactorily demonstrated it by dissection in both *hastata* and *undata*. When the integument is cut away from the whole vicinity, it appears as a circular foramen, about half a line in diameter. It does not appear to be an anus, but probably admits water for respiration.

The specific name, *undata*, indicates the waved pattern of colouring on the tentacles. The term Muzzlet, which I have assigned to the genus, alludes to its most prominent characteristic,—the protrusion of the gonidial tube, like a proboscis or muzzle.

hastata.
triphylla.
UNDATA.

THE TREFOIL MUZZLET.

Peachia triphylla.

(Sp. nov.)

Plate X. *Fig.* 2.

Specific Character. Column pear-shaped, moderately long; conchula bearing three ovate or leaf-like lobes; tentacles marked with arrow-heads, and based with brown.

GENERAL DESCRIPTION.

Form.

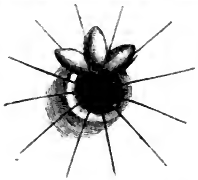
Column. Pear-shaped; lower extremity rounded, with a distinct central orifice, around which the skin is puckered. Surface covered with fine and close-set transverse wrinkles, and with minute suckers, which have a strong adhesive power.

Disk. Flat, but very protrusile; radii distinct.

Tentacles. Twelve, in one circle, marginal; thick at foot, and tapering to a point.

Mouth. About one-fourth of an inch wide at the margin, shelving downward funnel-like; lip rugose and erectile.

Conchula. Cut into three ovate, leaf-like lobes.



CONCHULA AND MOUTH OF P. TRIPHYLLA (*magnified*).

Colour.

Column. Opaque pale reddish-brown, or bay, with numerous irregular longitudinal splashes of rich red-brown. No pale lines indicate the septa.

Disk. Reddish buff; each radius marked with a minute brown speck in its centre: the gonidial radius, however, and the opposite one, are pure white, without spots.

Tentacles. Pellucid, each marked with a double row of brown arrowheads, exactly as *P. hastata,* but the foot is crossed by a band of deep brown, the discal edge of which is perfectly defined; the confluence of these bands forms a broad circle of brown bounding the disk. In the gonidial tentacle, however, and in the opposite one, the band is wanting, as well as the lower arrows, the opaque white of the radius running up the front of each of these tentacles half-way to the tip.

Mouth. Dark brown.

Conchula. Pure opaque white; the lobes without spot or core.

SIZE.

Length three inches; greatest diameter one inch and a half. Disk three-quarters; tentacles about one inch.

LOCALITY.

The Channel Islands.

I have had no opportunity of seeing the animal to which the above description applies. It was taken at Guernsey, in December, 1858, and came into the possession of Dr. G. C. Wallich, who has kindly drawn out for my use copious notes, and furnished me with beautiful coloured drawings. It appears intermediate between *hastata* and *undata,* the species already recognised; but I cannot satisfactorily assign it to either, as it differs from both in the form and number of the conchular lobes. I have therefore given it a name expressive of these peculiarities.

" The suctorial processes," remarks Dr. Wallich, " appear to consist of simple depressions of the integument, each of which exhibits an oblong muscular body at its base, whereby a vacuum may be formed, and adhesion accordingly secured. On examining these muscular bodies under a power of 250 diameters, longitudinal as well as transverse striæ are distinguished. The nature of these suckers was strikingly manifest on attempting to turn the animal in the glass, when they exhibited the appearance of a number of pointed papillæ, the apices of which clung forcibly to the glass, whenever a strain was put upon the creature to disengage it."

hastata.
TRIPHYLLA.
undata.

PEACHIA CYLINDRICA (Reid).

In the Annals of N. H. for January, 1848, Dr. Reid described and figured, under the name of *Actinia cylindrica*, an Actinoid, which was washed ashore at St. Andrews. It must have certainly been a *Peachia*, and may possibly have been an immature *P. hastata.* The points in which it disagreed with such specimens of the latter as I have seen were the following:—1. It was but one and a quarter inch long. 2. The conchular lobes were *twelve*, six of which were very minute; *triangular*, *orange*, with translucent edges. 3. Twelve bands of faint reddish-brown radiated across the disk.

GENUS III. HALCAMPA (Gosse).

Actinia (Peach).
Peachia (Gosse).

Column long, slender, cylindrical, or swollen at the inferior extremity, which appears to be imperforate: no distinct margin. Surface without loopholes, but studded with minute suckers.

Disk flat. Radii distinct.

Tentacles of one kind, few (less than twenty), marginal or sub-marginal, cylindrical, obtuse; perfectly retractile.

Mouth simple. No obvious gonidial development.

ANALYSIS OF BRITISH SPECIES.

Tentacles 12, banded; lives in sand	*chrysanthellum.*
Tentacles 16, white; lives in eroded rocks	*microps.*

THE SAND PINTLET.

Halcampa chrysanthellum.

PLATE VII. *Figs.* 9, 10.

Specific Character. Tentacles twelve, in one row, as long as the diameter of the column, banded.

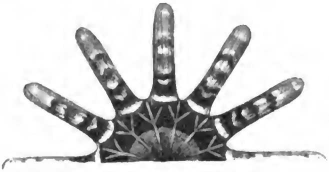
Actinia chrysanthellum.	PEACH, in Johnston's Brit. Zooph. Ed. 2, i. 220; pl. xxxvii. figs. 10—15. COCKS, Rep. Cornw. Soc. 1851, 6; pl. i. figs. 20, 21.
Peachia (?) *chrysanthellum.*	GOSSE, Linn. Trans. xxi. 271; Man. Mar. Zool. i. 31.
Halcampa chrysanthellum.	IBID. Annals N. H. Ser. 3. i. 418.

GENERAL DESCRIPTION.

FORM.

Column. Cylindrical, lengthened, worm-like (extending to ten times its diameter or more); slightly invected; terminating below in a rounded extremity, which is generally distended into a bladder-like form and translucent thinness, and is incapable of being retracted; merging above into the tentacles without a parapet. Surface studded with excessively numerous, minute, sucking warts.

Disk. Plane. Radii twelve, distinct.



HALF-DISK OF H. CHRYSANTHELLUM (*magnified*).

Tentacles. Twelve, strictly marginal, set in a single row, their feet in contact. Nearly cylindrical, with rounded extremities, about as long as the general diameter of the column, usually carried pointing upwards and outwards, slightly arched; perfectly retractile by the ordinary process of inversion.

Mouth. A line without distinct lip; not elevated on a cone. Furrowed within.

COLOUR.

Column. Drab or dirty white; the septa distinct as white longitudinal lines; the swollen bladder-like extremity translucent, and almost colourless, except for the septa.

Disk. Marked with a pretty star-like pattern, consisting of a pale blue area, inclosed in a pale line, and surrounded by twelve triangular rays of a dark brown hue; each triangle surmounted by a pale W-like figure, which incloses a dark brown area, according to the accompanying pattern.

Tentacles. Pellucid brown, the front crossed by six semi-rings of opaque white, of which the second, the fourth, and the fifth (counting from the foot upward) are angular, the second pointing downward, the fourth and fifth upward. The pellucid interspaces are tinged with brown, deepest on the first, second, and fourth; and the first white ring, surrounding the foot, is sometimes tinged with sulphur-yellow.

Mouth. Yellowish-white.

SIZE.

Specimens reach to an inch and three-quarters in length, and one-eighth of an inch in average diameter; the extremity is frequently inflated to one-fourth.

LOCALITY.

Coast of Cornwall: buried in sand at low water, and in tide-pools.

This is a very interesting little zoophyte, which was first made known by Mr. C. W. Peach, who has faithfully described its person and manners. Its lack of an expanded base of course removes it from the genus *Actinia;* and when I formed the genus *Peachia*, it was under the supposition that the present little species was to be therein included. Subsequent personal acquaintance with it, however, induced me to constitute a new genus for its reception, to which I have since added a second species. The name of this genus, *Halcampa*, formed from ἅλς, the sea, and κάμπη, a maggot, alludes to the grub-like form of the animal; a form which I commemorate also in the English name, *pintlet*, from pintle, an iron pin. The specific appellation must be accepted, I suppose, as expressing the general resemblance of the painted disk to a flower.

In May, 1858, by the kind courtesy of J. Scott, Esq. of Her Majesty's Customs, I was favoured with two consignments of this pretty little species, including upwards of a dozen specimens. They were procured at Fowey, in Cornwall. When turned out of the package in which they had travelled, they looked like little earthworms.

Some of them I dropped into holes which I had made with a stick in damp sand, carefully pouring the sea-water in afterwards. These maintained their place, and soon protruded and expanded their disks from the surface of the sand. Others I simply laid on the sand when covered with water; these presently began to bore with the inferior extremity, and soon descended as far as the level of the disks, which then expanded, as if at home. Several of those specimens I still possess in health, after about eleven months' captivity; and I have reason to think that in the meantime they have produced living young.

After they had been domiciled for a time in a wineglass nearly filled with sand, and covered with a shallow layer of water, I wished to remove them to a larger vase. On washing out the sand, I found the animals firmly adhering to the glass by the lower parts of their bodies. When removed, they would take instant hold of the smooth glass, with the suckers on any part of the body, four or five of these drawing out to a considerable length when force was applied. On examination of these suckers, we see that the skin is covered with very minute and close-set, irregularly shaped, rounded warts, which have a firmly adhering function. They are best seen on the distended skin of the hinder extremity, where, under a power of 150 diameters, they prove to be granular nuclei in the substance of the skin, dense in the centre, and gradually thinning to an undefined circumference, elevating the surface with a smooth rounded outline to a height about equal to their diameter; viz. about .002 inch. Many of them certainly have a shallow pit on the summit, and I am persuaded that their adhesion is a sucking. In the middle part of the body, these warts are elongated transversely, and have a tendency to run in close-set annular lines.

I have not been able to satisfy myself of the character of the inferior extremity. It often appears as if it were distinctly perforate; but I believe this is an illusion, produced by the following phenomenon. As the animal lies on its side, it is continually being constringed, the constriction gradually moving downward till it passes off at the extremity. The parts above and below being inflated, and being as transparent as glass, one sees, looking directly at the extremity, the inner edge of the constriction, through the transparent integument, exactly like a terminal orifice, at the moment before it passes off.

The manners of the species are lively and pleasing: it is very susceptible of alarm, when it closes and disappears in its burrow with great quickness; it is, however, soon full-blown again. Under irritation, as when fine clay is mixed with the water, the tips of the tentacles are jerked from side to side with a suddenness and force that contrast with the languor common to the tribe, and which seem to indicate both a higher nervous sensibility, and also a greater development of the muscular system.

My experience, as well as that of Mr. Peach, shows that it is a species well adapted for an aquarium, and that no special treatment is needful beyond a layer of sand equal in depth to the length of the column.

The stomach is sometimes protruded, and inflated so as to form an ovate bladder as wide as the diameter of the column. This occurs as well when comfortably ensconced and expanding, as when exhausted by lying out of water.

Mr. Peach has favoured me with notes of a singular example of the reproduction of organs in this species. A specimen in his possession displayed a transverse cut, apparently the result of accident, which extending almost quite across the column just below the disk, caused the fore part to fall over, hanging only by a fragment of skin. The tentacles, which now of course drooped from the bottom of this hanging part, presently disappeared by absorption, while at the same time from each of the severed surfaces a new disk with new tentacles was developed. Thus the old stump became pretty much as before, only slightly shorter, but the severed piece lost the tentacles at one end, and acquired new ones at the other.

Halcampa chrysanthellum has been found as yet only in Cornwall, but in the following spots:—

Fowey, *C. W.P.:* Gwyllyn Vase, Pennance, &c., *W.P.C.*

P. hastata.
CHRYSANTHELLUM.
microps.
Edwardsia.

THE ROCK PINTLET.

Halcampa microps.

PLATE VII. *Fig.* 11 : XII. *Fig.* 6 (*magn.*).

Specific Character. Tentacles sixteen, in two rows, very short, without markings.

Halcampa microps. GOSSE, Annals Nat. Hist. Ser. 3. ii. 195.

GENERAL DESCRIPTION.

FORM.

Column. Cylindrical; 8-invected, the tegumental insertions of the septa being the boundaries of the swellings; hinder extremity inflatable, protrusile, adhesive: skin minutely granular, enveloped in a thin mucus, which entangles foreign matters; ordinarily covered with minute, close-set, transverse wrinkles.

Disk. The rounded anterior extremity of the column, around which the tentacles are planted in two contiguous circles (though those of each row are remote *inter se*). Sometimes this rounded form is not observed, and then the disk is flat.

Tentacles. In two rows; the first of eight, about .014 inch long, and .0045 inch in medium diameter; the second also of eight, marginal, remote, alternate with the former, papilliform, their length not exceeding their diameter, or .005 inch. When expanded, those of the first row either stand erect, or arch slightly outward: their movements are rather sudden; their form quite cylindrical, with round ends; their walls thick, apparently imperforate; a few cnidæ scattered in their substance.

Mouth. Elevated on a small abrupt papilla.

COLOUR.

Pellucid yellowish white, positive in the ratio of opacity of the parts without markings. Ovaries tinged with flesh-colour.

SIZE.

Column when moderately extended about .025 inch in diameter, to a point about halfway down its length; diameter of posterior inflation at the same time .065 inch. Total length in this condition .3 inch.

LOCALITY.

South Devon; rocks between tide-marks.

I found this tiny species in much eroded limestone from a cavern at Oddicombe, Devon, associated with *Edwardsia carnea*, in June, 1858. Having chiselled off many fragments of the rock, I put them into glass jars of sea-water; and in a day or two found *Halcampa microps* crawling up the side of the jar, adhering by its inflated skin. In the course of a day or two more, another and another appeared, until five or six had come under my notice, most of them adhering to the glass. They were active and locomotive, moving along the surface with ease and comparative quickness (at least ten times their length in a night), adhering by any part of the hinder moiety of the column. Very frequently they threw the anterior portion suddenly round, like an irritated caterpillar; and almost continually constrictions were passing down in succession from head to tail.

They are very coy and very sensitive, retracting forcibly and suddenly when alarmed. I attempted to feed them, but only frightened them.

The specific name is from μικρὸς, small, and ὢψ, the face.

chrysanthellum.
MICROPS.
Edwardsia.

GENUS IV. EDWARDSIA (QUATREFAGES).

Scolanthus (GOSSE).

Column long, slender, cylindrical, divided into three distinct regions, of which the two terminal are retractile within the central one. Anterior region forming a short thick pillar (*capitulum*) of less diameter than the central, and more delicate. Central region (*scapus*) covered by a skin (*epidermis*) more or less thick and opaque. Posterior region (*physa*) thin, pellucid, inflatable like a bladder; imperforate (?).

Disk sometimes flat, sometimes conical.

Tentacles of one kind, few (less than thirty), marginal, arranged in one or two rows; slender, moderately long, pointed; perfectly retractile.

Mouth simple. No obvious gonidial development.

ANALYSIS OF BRITISH SPECIES.

Tentacles sixteen, transversely dashed with white; *capitulum* purple brown, with white markings; lives in sand	*callimorpha.*
Tentacles twenty-eight, pellucid crimson; *capitulum* pellucid carneous; lives in eroded rocks	*carnea.*

THE PAINTED PUFFLET.

Edwardsia callimorpha.

PLATE VII. *Fig.* 7.

Specific Character. Tentacles sixteen, transversely dashed with white: *capitulum* chocolate-brown, painted with white.

Scolanthus callimorphus.	GOSSE, Annals N. H. Ser. 2. xii. 157; pl. x.
Edwardsia callimorpha.	IBID. Linn. Trans. xxi. 271: Man. Mar. Zool. i. 31; fig. 45: Ann. N. H. Ser. 3. i. 418.

GENERAL DESCRIPTION.

FORM.

Column. Nearly cylindrical, slightly enlarging posteriorly, worm-like, the length in extension being to the diameter as 10 : 1. *Capitulum* a short pillar, slightly contracted above and below the middle, and most expanded at the margin; marked with eight invections, each of which is divided towards the summit into two; the surface smooth and delicate. *Scapus* opaque, leathery, rough and minutely corrugated. *Physa* (not observed).

Disk. Plane; radii distinct.

Tentacles. Sixteen, marginal, set apparently in a single row, but yet slightly alternating, corresponding to the invections and semi-invections; long (nearly thrice the diameter of the disk), slender, slightly tapering, obtusely pointed. They radiate horizontally or diagonally, and are frequently intro- or retro-verted.

Mouth. Set on a prominent cone.

COLOUR.

Column. *Capitulum* rich chocolate-brown, irregularly dashed with white and black, each invection bearing a conspicuous lozenge-shaped spot of cream-white at its foot, and each semi-invection a triangular spot of white at the summit. These marks are well defined, and their effect is very beautiful. *Scapus* a deep orange-yellow, somewhat tarnished.

Disk. White, marked with a star of pointed arches of deep sienna-brown, each arch having a radial stria for its centre, and a circle surrounding the mouth for its base. The two gonidial radii dark brown.

Tentacles. Transparent and colourless, marked with spots and dashes of opaque white, arranged in irregular transverse rows and rings, which increase in number and size until they become confluent towards the tips, which are thus pure white. The glassy translucency of the tentacles throws out these opaque markings with beautiful effect, especially as the foot of each is girded by a broad circle of white.

SIZE.

Column about three-quarters of an inch long when contracted, but extending to two and a half inches, with a diameter of one-fourth : disk one-fifth of an inch ; expanse of flower about one inch.

LOCALITY.

The south-western coasts of England ; deep water.

In the summer of 1853 I obtained, from about five fathoms in Weymouth Bay, a specimen of this species, which I described and figured in the Annals of Nat. Hist. under the name of *Scolanthus*, as I supposed it to be an unrecognised form. M. de Quatrefages had, however, published an able and elaborate Memoir* on a form which he had named *Edwardsia*, in well-merited honour of the eminent French zoologist, M. Milne Edwards. On mature consideration, I was convinced that my Weymouth specimen ought to be placed in this genus; for though I had described a posterior orifice, which is wanting in *Edwardsia*, it is probable that I mistook, for such, the depression at which the *physa*, which I did not see, was retracted. The animal appears to be quite distinct from all of the three French species described by M. de Quatrefages, and to be well marked by its beautiful painting, which, resembling the inlayings of veneer-work, or the figures of the kaleidoscope, suggested to me a name derived from καλὸς, beautiful, and μορφὴ, form. The English term commemorates the habit of the genus, of puffing out the bladder-like termination of the column.

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* Annales des Sci. Nat. 1842, Ser. 2, xviii. 65.

The habit of the species, judging from what I have seen of it in captivity, is to burrow in fine gravel or sand at such a depth as allows it to protrude the coloured *capitulum* from the surface. Here it expands its tentacled disk for passing prey: I fed it with fragments of a shrimp, and found that it ate with the same avidity, and in exactly the same manner, as its cousins, the Sea-Anemones; the tentacles catching and moving to and fro the morsel, and disposing its position and direction so as to facilitate the mouth's grasping it; this latter organ expanding its flexible lips to an apparently indefinite width, and gradually enveloping the presented food.

If rudely touched, the disk was suddenly withdrawn; the *capitulum*, and then the upper two-thirds of the *scapus*, disappearing in rapid succession by a process of introversion, exactly like that by which the earthworm withdraws its fore parts, or, to use a homely simile, like the turning of a stocking. The extent to which the introversion proceeds depends on the degree of annoyance to which the animal has been subjected, or on its wayward will. It is capable of crawling along in its subterraneous abode, while contracted; pushing aside the gravel with the front of its body. It proceeded in this way two or three inches in as many hours, while I was watching it, before it turned upwards and thrust out its head; the evolution of the *capitulum* not beginning until the surface was reached.

A second specimen of this species was dredged by the Rev. Charles Kingsley, off Brixham, in January, 1854. He informed me that the form and colours agreed with my description, except that the hues of the *capitulum* were more brilliant, and those of the disk less so. "He broke off his tail in disgust two days ago, but has now thought better of it, and has begun wisely to grow a new tail, which is at present transparent, *but with a well-defined orifice*. He lies half-buried in sand, and has several times temporarily attached himself by his new tail."*

Since this page was in type, Dr. Hilton has taken a specimen at Bordeaux Harbour, Guernsey, which he has kindly transmitted to me. In its general characters and markings, it agrees with the specimen described above; it is, however, much larger, being at least five inches long, and three-eighths in diameter. The *scapus* is more spindle-shaped, and more coarsely invected and corrugated; the *physa* I have seen inflated, but slightly. The tentacles which correspond to the gonidial radii, and the pair at right angles to these, are much shorter than the rest. The dark gonidial radii have a flush of rich green.

Many points in the form and anatomy of this genus indicate, as has been ably shown by Quatrefages, a decided approach to the *Echinodermata*, through such forms as *Syrinx* and *Sipunculus*.

Weymouth, *P. H. G.*: Brixham, *C. K.*: Guernsey, *T. D. H.*

[Beautempsii.]
ECHINODERMATA. CALLIMORPHA.
[Harassi.]
carnea.
H. chrysanthellum.

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* Kingsley in litt.

THE CRIMSON PUFFLET.

Edwardsia carnea.

PLATE VII. *Figs.* 5, 6 : XII. *Fig.* 3 (*magn.*).

Specific Character. Tentacles twenty-eight, pellucid crimson ; *capitulum* pellucid flesh-pink.

Edwardsia carnea. GOSSE, Annals N. H. Ser. 2. xviii. 219 ; pl. ix. figs. 1—4. Ibid. Ser. 3. i. 418.

GENERAL DESCRIPTION.

FORM.

Column. Generally cylindrical, sub-equal in diameter throughout, worm-like, length to diameter as 10 : 1. *Capitulum* cylindrical, or slightly barrel-shaped, marked with eight invections and eight semi-invections, like the preceding ; margin tentaculate. *Scapus* slightly more coriaceous than the other regions, but clothed with a very rough epidermis, so slightly adherent that it frequently forms a partially free tube. *Physa* thin, membranous, globose, transparent, revealing the septa ; imperforate.

Disk. Plane ; radii distinct.

Tentacles. Twenty-eight, sub-marginal, arranged in three rows,—8, 8, 12 = 28 (perhaps the ultimate number of the third row may be 16) ; versatile in shape, being sometimes very short and fusiform, at others elongated to thrice the diameter of the disk, tapering and very slender. They generally radiate diagonally, arching outwards.

Mouth. Set on a low cone; lip furrowed.

COLOUR.

Column. *Capitulum* translucent, delicately tinted with pink, each invection bounded by a fine line of opaque white or brilliant pale yellow, and marked with a longitudinal dash of the same near its foot. The stomach is plainly visible, as a thick axis of rich scarlet. *Scapus* and *physa* of the same rose-tinged translucency, but the *epidermis* of the former is of a brownish-yellow hue.

Disk. A star of cream-white rays on a translucent ground.

Tentacles. Lovely pellucid pink, sometimes with alternate bands of less and more positive colour; frequently becoming a pale opaque yellow at foot, which hue runs up in a point on each side.

Mouth. Scarlet, leading to a stomach of the same rich hue.

SIZE.

Column, in extension, reaches to nearly an inch in length, with a general diameter of one-tenth; *capitulum* one-sixth in length, one twenty-fourth in diameter; expanse of flower one-fourth.

LOCALITY.

The south-western coasts of England; eroded rocks.

This beautiful and interesting little species was first made known by myself in the Annals of Nat. Hist. for September, 1856, from a specimen kindly forwarded to me by Miss Pinchard, who obtained it from the rocky islet called the Orestone, off Torquay.

In May, 1858, three specimens were forwarded to me by my friend, Mr. F. D. Dyster, out of some hundred and fifty that were found by a collector on rocks, between tide-marks, near Tenby; and a few weeks after this I was so fortunate as to discover a populous home of the species, in the neighbourhood of Torquay.

On the south side of the promontory, called Petit Tor, on the coast of South Devon, there is a low-roofed cavern, whose orifice is left bare at the lowest water of spring-tides. The interior parts of the floor are covered with the common limestone shingle, and, being more elevated than the mouth, afford an opportunity of working within, whenever one can gain admittance. The roof and sides of this cave are studded with the pretty little Crimson Pufflet, as well as with many other Anemones. The tide having receded, they are very readily discovered by their crimson columns projecting an eighth of an inch from the dark floccose rock. The limestone is much eroded by *Saxicavæ;* and it is in the old burrows of these Mollusca that the *Edwardsia* dwells, clinging to the sides or bottom of the hole by the suckers on its skin, the column and disk now protruding, where formerly the siphons of the Mollusk projected. It has forcibly reminded me of Ossian's beautiful image of the fox looking out of the window in the desolate dwelling of Moina.

In captivity the animal is able to roam about the glass by means of its adhesive suckers.

Under high magnification the epidermis is seen to be a film of condensed mucus, evidently composed of disintegrated cells, in which are entangled a few *cnidæ*, some threads and many spores of *Confervæ*, and multitudes of *Diatomaceæ*, of many species. I carefully removed piecemeal the whole epidermis from one, exposing the skin of the entire *scapus*, which then was seen to be fleshy, pellucid, pink, and in all respects like that of the terminal regions, except that it was slightly more dense. In a few days the *scapus* was again encased in an epidermic tube, thin and semi-transparent, but, instead of being yellowish or brown, it was quite grass-green. This I found to be owing to the entanglement of conferva-spores in the mucus, the water having been exposed for some days in a shallow saucer.

After having been kept some days in stale water, the animal is found much contracted and retired to the middle part of the epidermic case. This may be then readily removed, the adhesion having ceased. The organic connexion between the epidermis and the scapus thus appears to be less in this species than in others of the genus, and approximates it to *Phellia* in the *Sagartiadæ*.

This pretty Pufflet is easily kept in the aquarium, but it appears to require a considerable volume of water in a state of purity. It sometimes floats at the surface, extended at full length. It will feed readily on minute atoms of raw meat, like the common Anemones. All its movements are rapid, sudden, and spasmodic.

Torquay, *P. H. G.:* Tenby, *F. D. Dyster.*

[Harassi.]
Phellia. CARNEA.
H. chrysanthellum.

? Edwardsia Beautempsii (Quatref.).

About the same time that Mr. Kingsley dredged *E. callimorpha* at Brixham, he found at Torquay, washed up after an easterly gale, an individual of the same genus, but manifestly distinct in species. While generally agreeing with *E. callimorpha*, in size and form, it differed in the following points:—1. The *scapus* was less opaque, more smooth and lubricous, and studded with longitudinal rows of minute warts between the invections. 2. The *capitulum* was clavate, proportionally longer, and of the same colour as the *scapus*, a pale pinkish-buff, or light orange. 3. The tentacles were fourteen in number, slightly uncinate or incurved, banded with dark buff. 4. The disk was transparent and colourless, with a dark protruded mouth. From these characters I think it probable that the animal in question was referrible to the *E. Beautempsii* of M. de Quatrefages.

GENUS V. ARACHNACTIS (SARS).

Column moderately long, cylindrical, rounded at the inferior extremity, but not swollen, imperforate. Surface capable of temporary adhesion, and therefore probably studded with minute suckers.

Disk —— ?

Tentacles of two kinds, the one marginal, very long, slender; the other gular, short; few in each series, not retractile.

Mouth, a simple slit.

Habit: freely swimming in the sea.

There is but one British species, *A. albida.*

THE SPRAWLET.

Arachnactis albida.

Specific Character. Marginal tentacles longer than the column, gular tentacles about one-fourth of the length of the column.

Arachnactis albida. Sars, Fauna Litt. Norveg. i. 28; pl. iv. fig. 1—6.
Forbes and Goodsir, Trans. Roy. Soc. Edinb. xx. 310.

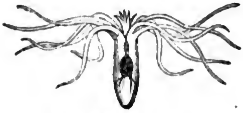
GENERAL DESCRIPTION

Form.

Column. Shortly cylindrical [pear-shaped, E. F.], sub-globular in contraction, becoming gradually smaller and rounded at the inferior extremity, where no orifice has been observed. Surface smooth [but with the power of adhering, at least by the inferior extremity (E. F.), which implies the existence of suckers]. Substance softly fleshy.

Disk. [Undescribed.]

Tentacles. Of two kinds. First series marginal, twelve to fourteen in number, filiform, tapering, very long, slender and pointed: of these eleven are about equal in length and thickness, while one or two are very much shorter and smaller, and unequal *inter se.* Some individuals show traces of the budding forth of another tentacle. These smaller and apparently sprouting tentacles always occur at that part of the circle which corresponds to one angle of the mouth. Second series springing immediately around the mouth-slit, eight to twelve in number [sixteen, E. F.], conical, pointed, scarcely one-tenth as long as those of the first series; some smaller than the rest, and apparently budding, and these correspond in position with the budding ones of the first series.


ARACHNACTIS ALBIDA.

Mouth. A simple slit.

Colour.

Column. Pellucid whitish, displaying the dark brown stomach through its translucency [dusky white, tinged with tawny, E. F.].

Tentacles. First series whitish with dark brown tips [tawny and white, E. F.]. Second series dark brown on the front face.

SIZE.

Length of column about one-third of an inch [one inch, E. F.]; diameter one-eighth; length of marginal tentacles one and a half inch [three or four inches, E. F.].

LOCALITY.

The Hebridean and Norwegian Seas.

This very interesting form, the only British example of a natatory Anemone, has occurred on two occasions, both in the month of August, and both in the Minch, the strait that divides the Isle of Lewis from Scotland:—first by Dr. Balfour in 1841, who obtained a number of specimens, but all in a mutilated condition, and subsequently by Messrs. E. Forbes and Goodsir in 1850. In the interim, the Rev. Mr. Sars, of Bergen, had described and figured it in an elaborate memoir in the "Fauna Littoralis Norvegiæ" (1846); and it is from this that we derive our chief knowledge of the species, Forbes's account being exceedingly meagre.

It appears in the vicinity of the Isle of Floröe, on the coast of Norway, in autumn and winter, swimming on the smooth sea, sometimes in dense shoals, sometimes singly, borne on the northward current. Comparing the periods of its occurrence in the Hebridean and Norwegian seas, we may infer that it comes up from the warmer parts of the Atlantic; and it might be hopefully looked for on the west coasts of Ireland in the earlier summer. As it swims it carries the marginal tentacles horizontally spread, when it looks not unlike a long-legged spider: hence the generic name from *ἀράχνη*, a spider, and *ἀκτὶς*, a ray, and hence also the English term I have assigned to it. The superior or the inferior extremity is indifferently carried uppermost. It swims by a languid undulation of the long tentacles; but it has a certain power of crawling also; for these organs are strongly adhesive throughout, and the animal, attaching itself by these means to foreign bodies, slowly draws itself forward.

The gular tentacles are usually projected, and clasped together, but sometimes they are horizontally spread. In the latter case, if touched, they are instantly drawn together, and slightly contracted, but never retracted; they have no adhesive power. The appearance and situation of these organs have suggested to my mind the thought that possibly they may be the lobes of a *conchula*, in which case the animal would be a swimming *Peachia:* if, however, they are true gular tentacles, then the alliance is obvious with the following genus *Cerianthus*. May it not possibly be the immature condition of this latter?*

There are discrepancies in form and colour, and especially in size, between the specimens seen on our own coast, and those described by Mr. Sars, which make it possible that these may constitute two species. We trust other specimens may clear up this and other questions of interest. Forbes found a species of the same genus abundant in the Grecian Seas, but whether identical with this, we are not informed.

The internal structure, which, from the transparency of the integuments is clearly seen, presents nothing peculiar.

? Peachia.
ACALEPHA. ALBIDA. Anthea.
? Cerianthus.

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* See M. Haime's observations on the free-swimming young of *Cerianthus*, *infra*, p. 273.

GENUS VI. CERIANTHUS (DELLA CHIAJE).

Tubularia (GMELIN).
Moschata (BLAINVILLE).
Edwardsia (FORBES).

Column lengthened, cylindrical, swollen and bulb-like at the inferior extremity, which is perforated with a distinct orifice; expanding trumpet-like at the margin, which merges into the tentacles, without parapet or fosse. Surface smooth, without loop-holes, or (apparent) suckers. Usually enveloped in a loose, non-adherent tube, closed at the lower end, of tough, membranous texture, and ragged exterior.

Disk wider than column, but not over-arching: funnel-shaped, with conspicuous radii.

Tentacles of two kinds; the one marginal, the other gular; both in perfect circles, those of each equal *inter se*, moderately numerous, slender; absolutely incapable of retraction.

There is but one British species as yet certainly assigned to this genus, *C. Lloydii*.

THE VESTLET.

Cerianthus Lloydii.

PLATE VI. *Fig.* 8.

Specific Character. Inferior orifice excentric: septa regularly graduated.

Edwardsia vestita.	GOSSE, Ann. N. H. Ser. 2. xviii. 73.
Cerianthus membranaceus.	IBID. Ibid. Ser. 3. i. 418.
Lloydii.	IBID. Ibid. Ser. 3. iii. 50.

GENERAL DESCRIPTION.

FORM.

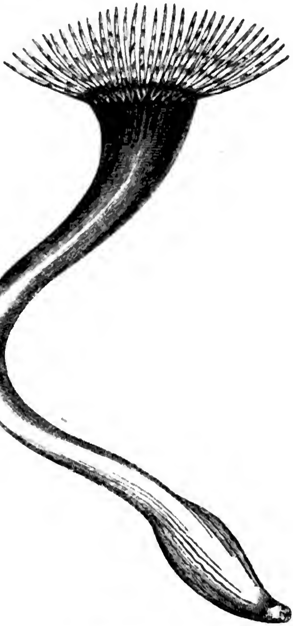
Column. Greatly lengthened, cylindrical for the most part, but generally swollen at the inferior end into an elliptical bulb, and gradually expanding into a trumpet-shaped summit to about twice the median diameter. No distinct margin, the summit of the column itself dividing into the tentacles, the ridges of which are apparent for some distance below the point where they separate. Inferior extremity pierced with a round orifice, which is placed at one side of the axial line. Mesenteric prolongations of the visceral septa twenty-four, of which one pair are very minute, while the opposite pair extend to the immediate vicinity of the inferior orifice. From the one to the other of these conditions there is a regular gradation in length, but from the longest to the middle pair the diminution is slight, while from the middle pair to the shortest it is great and rapid.

Disk. A deep funnel-shaped cavity, about twice as wide as the column, entire, circular, not overarching.

Tentacles. Of two kinds. First series strictly marginal, sixty-four, set in two rows, alternating, but with their bases in mutual contact. They are equal, slender, conical, sharp-pointed, divided more or less conspicuously into knobs, by some half-dozen constrictions. Their contour is somewhat stiff, and they are generally carried arching upward and outward; but some of the inner row are frequently erect, and others inclined to a point over the disk. Second series remote from the first, crowded, in four irregular circles, springing immediately around the mouth; filiform, obtuse, sub-equal, not half as long or thick as those of the first series.

Mouth. A transverse slit; lip minutely furrowed, not projecting.

Investing Tube. Cylindrical, much wider than the animal, which is loosely invested by it without attachment in any part, papery or felty in texture, thick and soft, composed of many layers, the outer of which present ragged foliations. The tube can easily be detached, when the animal immediately begins to form a new one, by throwing off the material from the entire surface of the column; this at first is adhesive, tenacious, and very tough, pellucid, but gradually becomes milky, and finally opaque, entangling mud and sand in its substance. It is wholly composed of *cnidæ*, the discharged *ecthoræa* of which, in incalculable numbers and of great length, intertwine and form a sort of *felt*.



CERIANTHUS *without its tube.*

COLOUR.

Column. Pale buff or whitish, gradually becoming rich chestnut brown at the summit.

Disk. Pellucid white.

Tentacles. First series maronne or chocolate-brown at the foot, above which pellucid whitish, with chestnut bands. Second series dark maronne.

SIZE.

Length seven inches, under strong irritation contracting to two; general diameter of column one-fourth of an inch; of disk half an inch; expanse of flower one inch and a half.

LOCALITY.

The Menai Strait, in North Wales, and the Channel Islands; between tide-marks.

VARIETIES.

Specimens differ considerably in the depth and extent of the brown tints of the upper parts. In some the maronne or red-brown hue extends across the disk; in others it is scarcely discernible on the tentacles.

The present species has generally been supposed to be identical with that of the Mediterranean, of which M. Jules Haime has given an elaborate memoir (Ann. d. Sci. Nat. Ser. 4, i. 341). But in that species the arrangement of the mesenteric septa,—which M. Milne Edwards (Hist. Nat. des Coralliaires, i. 308) gives as generic, differs so importantly from what obtains in ours, as to demand a revision of the generic characters. I have therefore constituted it a new species, naming it after Mr. W. Alford Lloyd, to whose intelligent enterprise the study of Actinology is so greatly indebted, and to whom we owe our acquaintance with this very animal.

In the summer of 1856, this gentleman first obtained specimens from the Menai Strait, a fact which I noticed in the "Annals N. H." for July of that year, assigning the species to the *Edwardsia vestita* of E. Forbes. Mr. Lloyd also himself about the same time communicated two notes on the animal to the "Zoologist," in one of which he stated that he had then obtained eighteen specimens. Since that period he has procured many more, but, as I believe, only from the same locality. Some of these specimens he has courteously presented to me, and has thus enabled me to become personally familiar with the habits of the species.

The animal is hardy in the aquarium, bearing even the confinement of travel with more impunity than many commoner species. It is large and handsome, with a striking and noble aspect, and as it lives habitually expanded, and manifests considerable vivacity, it is a very desirable acquisition. The appearance of its felty tube is, however, repulsive; but this I have found by no means essential to its comfort, and have managed to dispense with it, by the following device. Having prepared a glass tube of suitable size, by cementing it perpendicularly to a stone of sufficient weight to maintain its stability in an upright position, I carefully removed the animal's own case, and dropped the denuded body into the new lodging. The *Cerianthus*, in every instance, became immediately at home, presently lengthened itself, and expanded at the margin of its new abode; and, as if the protection hereby afforded were sufficient, it threw off a new natural coat, only to such an extent as did not interfere with the sight of the body through the glass.

Another advantage is secured by this treatment; for whereas naturally the animal burrows in the mud, so that only the expanded flower is visible, and when put into a tank sprawls uncouthly along the bottom, the upright glass tube exposes the entire animal to observation, while it is protected from injury. I have specimens now which have been kept for many months in these circumstances, and are still in the highest condition.

In handling the animal during the process of stripping off the coat, it contracts by strong, sudden, and repeated jerks, at each becoming shorter. In these contractions the water in the visceral cavity is forcibly ejected from the terminal pore. This is not placed at the extreme point, which is marked by a depression, and by the convergence of lines, but is considerably excentric. I have also seen water ejected at intervals by the same orifice, when undisturbed, and that so forcibly as to hurl the floating atoms to the distance of two inches. I am pretty sure that I have also seen an inflowing current; but this is more gradual, and therefore less conspicuous. The orifice must be considered as only a provision for respiration, and not as a termination to the alimentary canal: the half-digested food is, as usual, discharged from the mouth.

The Vestlet feeds freely in captivity, greedily accepting fragments of raw flesh, and also skilfully catering for itself. One evening I amused myself with observing it capture its prey. It was one of those mentioned above, set in an upright test-tube, in an old-established tank, close to the side. The water contained a large number of minute *Entomostraca*, which, when the candle was placed near the tank, flocked from all parts to the light. I thus was able to direct the migrant crowd to any point that I pleased; and so brought them, when pretty well assembled, to the quarter which the expanded tentacles of the *Cerianthus* occupied. One and another were continually coming into contact with the tentacles; and it was highly interesting to mark the unerring certainty with which each was arrested the instant it touched a tentacle. No matter whether the foot, middle, or tip of the organ were touched, the little intruder inevitably adhered as if birdlimed, and apparently without a struggle; when immediately, with the most beautiful ease and precision, the fortunate tentacle jerked inward,—all the rest remaining as they were,—and, delivering the prey to the grasp of the gular tentacles, in a moment resumed its expectant position. So numerous was the giddy throng, that this manœuvre was every moment in practice, with some or other of the tentacles; so that scores, certainly, of the Water-fleas were captured while I was observing.

Mr. E. Edwards, of Menai Bridge, who has politely sent me a peculiarly fine specimen, has also favoured me with the following interesting note of the haunts and habits of the species.

"The only account I can give of the *Cerianthus* is, that I have found it in the Menai Straits in two distinct places, about five miles apart.

"The ground is a mixture of stones, gravel, and mud. The disk (some of a light and some of a dark colour) when first seen is on a level with the surface of the ground, but on approaching instantly disappears into its sac.

"The operation of taking it is difficult, as on the least disturbing of the ground it slips through the sac and is lost. The plan I adopt is to surround it with two or three spades, and each to act at the same moment, so as to undermine it in an instant, and press the ground, which causes its escape to be more difficult."

Mr. Holdsworth informs me that he found a specimen of this species * at the island of Herm, near Guernsey. "It was close to low-water mark, buried among mud and stones, with a large piece of granite covering it. Not more than half an inch of the tube was exposed when the stone was removed; and I found the rest winding about the irregularities of the ground in a most tortuous manner, turning sharp corners in its course downwards."

M. Haime (*Op. cit.*) furnishes us with some interesting details of the development of *C. membranaceus*, which doubtless apply equally well to the present species. "The young," he observes, "which I obtained, all died in the course of a few days. I never found any young advanced, within the parent, as is so common with *Actiniæ;* but the eggs, which float freely there, had already passed the first

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* It is right, however, to observe that the distinction between this species and *C. membranaceus* was not then suspected.

period, and I had no opportunity of seeing their segmentation. All were strongly ciliated, and therefore were already larvæ. They were oval in form, $\frac{2}{3}$ millim. in length. One end becomes concave, the other conical. In the centre of the former an opening forms, through which granules escape, and this becomes the mouth; the escape of the granules leaving the visceral cavity. Soon around the mouth four minute tubercles bud, which become tentacles; then two other tubercles nearer the mouth form lips; meanwhile the body becomes smooth, and cylindro-conical.

"The young lived in this state ten or twelve days; and attained one or one and a half millimetre in length. The body continued entirely ciliated, and was become very contractile. They swam freely in the manner of a *Medusa*, mouth downward, by means of elongations and shortenings of the trunk, and by openings and closings of the tentacles. Sometimes they would oscillate, or revolve on themselves."

Arachnactis.
Lloydii. Cyathophylliadæ.
[membranaceus.]

Cerianthus (?) vermicularis (E. Forbes).

Dr. Johnston, in his "Brit. Zooph." Ed. 2, p. 222; pl. xxxviii. figs. 2—5, has described and figured, on the authority of E. Forbes, under the name of *Act. vermicularis*, what seems either the young of the preceding species, after it has become stationary, or else a near ally to it. It is described as "0$\frac{8}{12}$ long," and the larger tentacles "$0\frac{2}{21}$;" but what the integer is to which these fractions refer we are not informed. There is doubtless some error, as in the description these organs are called "long;" and the figures, which are rude enough, are said to be "of the natural size," and these represent the animal as 1½ inch in length, with the tentacles, both marginal and gular, about ⅓ of an inch. A slender cylindrical column, with a trumpet-shaped margin, a funnel-shaped disk, two kinds of tentacles, and a slit-like mouth,—this animal possesses in common with the *Cerianthus.* It is represented, indeed, as standing erect, with the base attached in the manner of an *Actinia;* but this was probably drawn from assumption, and the attachment may have been similar to that which I have described in other *Ilyanthidæ.* Professor Forbes says the base was "not expanded," which favours this supposition. No tube or case is alluded to, but it may be that this is developed only at a later period of life. The specimens were dredged in fifty fathoms in the Shetland Seas; the column was greyish pink; the disk and gular tentacles white; the marginal tentacles fulvous. It gave out a vivid phosphorescent light when irritated in the dark.

TRIBE II.—CARYOPHYLLIACEA.

The large number of tentacles in the polypes of this tribe allies them to the ASTRÆACEA, and at the same time separates them from the MADREPORACEA and ANTIPATHACEA. Moreover, while the mode of increase in the compound species, by gemmation of the sides or base, removes them from the former, it affiliates them to the latter tribes. The majority of species deposit a corallum of lime, the calices of which are many-rayed. In compound species, the interstices between the corallites are not occupied by prolongations of the septal plates, but are granulous or porous, or sometimes faintly channeled. The stony plates (*septa*) are nearly or quite entire, rarely denticulate. Within the corallum the *septa* are connected *laterally* only by very distant dissepiments, if at all, never by series of transverse plates. The stars, in a transverse section, are simple; the chambers being rarely crossed by dissepiments: the calices are very commonly cylindrical, with narrow plates, arranged neatly around, and have often a broad bottom, generally porous and convex (DANA).

The vast majority of CARYOPHYLLIACEA are coralligenous; but this statement will not apply to those which belong to the British seas: for of the seventeen species presently to be described, seven are destitute of a corallum.

So far as I am acquainted with them, the tentacles of our native species (with the exception of *Zoanthus*) differ from those of our ASTRÆACEA, in having the *cnidæ* not lodged in the substance of the walls, but aggregated into masses which form warts on the surface. Most of them have, moreover, these organs terminated with globose heads, destitute of *cnidæ*, but studded with minute hairs (*palpocils*).

ANALYSIS OF THE BRITISH FAMILIES.

- Without a *corallum.*
  - Simple . . . . *Capneadæ.*
  - Compound . . . . *Zoanthidæ.*
- With a *corallum.*
  - Substance of *corallum* solid.
    - Interseptal chambers free . . . . *Turbinoliadæ.*
    - Interseptal chambers crossed by dissepiments .
      - Cavity gradually filling up . . . . *Oculinadæ.*
      - Cavity permanently open . . . . *Angiadæ.*
  - Substance of *corallum* porous . . . . *Eupsammiadæ.*

FAMILY I.—CAPNEADÆ.

The members of this Family do not, at any period of their existence, so far as is known, deposit a corallum, or any trace of calcareous matter. They are, moreover, permanently simple; for though there is reason to believe that they increase by budding, the polypes so formed quickly sever their connexion with the parent, and become independent though associated individuals. Thus they are essentially Anemones, such as we have already considered; yet there is something in their aspect which at once betokens their affinity with the Corals. In particular, the tentacles have the singular structure and knobbed form already noticed as peculiar to this tribe: and, contrary to the universal rule in the *Astræacea*, they increase in size outwardly,—the outer row containing the largest.

The body, adherent by a broad base, is fleshy or pulpy, copiously lubricated with mucus, and sometimes separating the outer skin into a deciduous epidermis. The surface is not furnished with suckers, nor pierced with loopholes. There are no *acontia*, but the *craspeda* are numerous and large, and their contained *cnidæ* are remarkably developed.

ANALYSIS OF THE GENERA.

Tentacles truncate	*Capnea.*
Tentacles crowned with bilobed heads	*Aureliania.*
Tentacles crowned with globose heads	*Corynactis.*

GENUS I. CAPNEA (FORBES).

Base expanded, swollen, adherent.

Column cylindrical, pillar-like; the margin forming a thick parapet, with a fosse. Surface smooth, without loopholes, invested with a woolly epidermis.

Disk circular, entire.

Tentacles very short, truncate, retractile.

But one species is known, *C. sanguinea*

THE CROCK.

Capnea sanguinea.

PLATE IX. *Fig.* 13.

Specific Character. Body scarlet; epidermis brown, 8-lobed.

Kapnea sanguinea. FORBES, Ann. N. H. Ser 1. vii. 82; pl. i. fig. 1.
Capnea sanguinea. JOHNSTON, Brit. Zooph. Ed. 2. i. 203; fig. 43. COCKS, Rep. Cornw. Soc. 1851, 1; pl. i. figs. 1, 2.

GENERAL DESCRIPTION.

FORM.

Base. Greatly expanded, irregularly inflated and lobe-like; its outline irregularly undulate; adherent.

Column. Cylindrical, pillar-like, higher than broad; the margin forming, when fully expanded, a thick and prominent granulate parapet, or collar, with a deep fosse. Surface smooth, without loopholes, invested on the lower two-thirds with a woolly epidermis, the upper edge of which is regularly 8-lobed.

Disk. Circular, entire.

Tentacles. Extremely short, truncate, having the aspect of squared tubercles; arranged in three rows of sixteen each, those of the outermost row the largest. Disk and tentacles perfectly retractile.

Mouth. Round, slightly puckered.

COLOUR.

Column. Vivid vermilion, or dull brownish scarlet, with darker longitudinal stripes on the inflated basal portion. Epidermis brown.

Disk. Yellowish flesh-colour.

Tentacles. Orange-scarlet, paler than the column.

SIZE.

Height of column one inch; diameter of disk one-fourth.

LOCALITY.

Deep water, off Isle of Man, on nullipore beds: deep water, four leagues west of Falmouth, on a valve of *Pecten maximus*.

The late E. Forbes first obtained this interesting form in August, 1840, and assigned to it its generic and specific names; the former from *κάπνη*, a chimney, from its resemblance to a chimney-crock, of which suggestion I have availed myself to make an English appellation. He tells us little of its history beyond what I have embodied above; except that it is an active creature, changing its form often, but always presenting more or less of a tubular shape; and that the upper part of the body can be retracted within the column as low as the commencement of the epidermis.

Mr. W. P. Cocks has since obtained a second specimen. This was considerably smaller than Forbes's, but agreed with it in essential points. Mr. Cocks has kindly put into my possession some notes of his specimen, which have enabled me to add a few details to Forbes's diagnosis; and also a coloured drawing made from the living animal, which I have copied in my Plate IX.

Phellia.

SANGUINEA.

Aureliania.

GENUS II. AURELIANIA (Gosse).

(Gen. nov.)

Corynactis (Thompson).

Base expanded, adherent.

Column conico-cylindrical, low, the margin forming a thick parapet with a fosse. Surface smooth, without suckers or loopholes: invested with a deciduous epidermis. Substance firm and coriaceous, opaque.

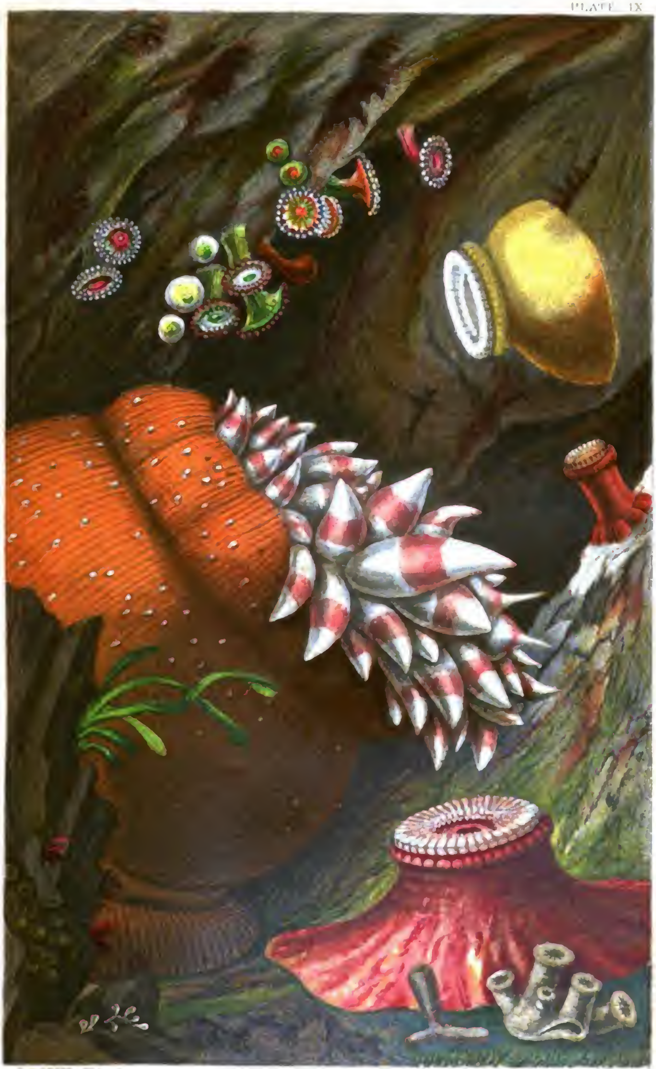
Disk flat, entire; radii distinct.

Tentacles in several rows, very short, knobbed; the heads more or less bilobate, and differing in form in the different rows; perfectly retractile.

Mouth slit-like, furrowed: stomach-wall protrusile.

ANALYSIS OF BRITISH SPECIES.

Base greatly expanded: crimson	*augusta.*
Base not exceeding column: yellow	*heterocera.*



P. H. GOSSE del.

1–5 CORYNACTIS VIRIDIS
6 BOLOCERA EQUES
7 ZOANTHUS SULCATUS
8 Z. ALDERI
9, 10 ZOANTHUS COUCHII
11 AURELIANIA AUGUSTA
12 A. HETEROCERA
13 CAPNEA SANGUINEA

THE CRIMSON IMPERIAL.

Aureliania augusta.

(Sp. nov.)

PLATE IX. *Fig.* 11.

Specific Character. Column rising from a widely expanded base: crimson.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; greatly expanded; the outline undulate.

Column. A low, thick pillar, springing gradually from the broad base like the trunk of a tree; the margin forming a thick and prominent parapet, the inner edge of which is crenate; and separated from the tentacles by a narrow and shallow fosse. Surface smooth, entirely invested with a soft, woolly, firm, thin epidermis (which fell off in patches soon after capture, and was not renewed). Substance firmly fleshy; opaque.

Disk. Somewhat elliptical, entire, flat or slightly convex; radii fine but distinct.

Tentacles. In four rows, the outer row containing 42; very short, knobbed; the knobs agreeing in form with those of the following species. Disk and tentacles freely and completely retractile.

Mouth. Slit-like, slightly furrowed.

COLOUR.

Column. Rich crimson, splashed with deeper crimson, and with pale yellowish. Epidermis dark olive-brown.

Disk. Light crimson.

Tentacles. Rosy white, with opaque white tips.

Mouth. Deep crimson.

SIZE.

Diameter of base two inches and three-quarters: of disk rather more than an inch; height from one to one and three-quarters.

LOCALITY.

North Devon; low water.

In August, 1856, the Rev. J. P. Greenly, being on a visit to Ilfracombe, found in a crevice of the slaty rock at Bull Point, at extreme low water, this magnificent species, which lived in his possession till the following April. To his courtesy I owe copious descriptions and drawings made from the animal while in life and health; by which I am enabled to draw up the foregoing diagnosis. I forwarded to him for comparison some drawings which I had by me of Mr. Thompson's *Corynactis heterocera;* and the agreement of the two forms in all essentials, and especially in the singular shapes of the diverse tentacles, showed that they were of one and the same genus, which was thus proved to have characters that called for its separation from *Corynactis.* At the period last named my kind correspondent forwarded the specimen to me: but it was already dead; and while it retained its form and colour, I was precluded from adding anything to my knowledge from personal observation.

In captivity the animal was lively and extremely sensitive, retracting its disk with remarkable suddenness and rapidity on alarm. It early crawled from the piece of slate on which it was captured, and took up a position on the side of a finger-glass in which it was kept. The tentacles were observed to vary the shape of their knobs, within slight limits: one here and there in the outer row occasionally approaching the hastate form of the next row.

sanguinea.
AUGUSTA.
heterocera.

THE YELLOW IMPERIAL.

Aureliania heterocera.

PLATE IX. *Fig.* 12.

Specific Character. Base scarcely exceeding column : yellow.

Corynactis heterocera. W. THOMPSON (w.), Proc. Zool. Soc. 1853. GOSSE, Man. Mar. Zool. i. 28. E. P. WRIGHT, Nat. Hist. Review, April, 1859, p. 122.

GENERAL DESCRIPTION.

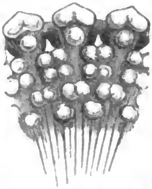
FORM.

Base. Adherent to rocks : scarcely exceeding the column in width; very slightly undulate.

Column. A stout cylindrical pillar, about as wide as high, but often constricted below the margin, when the lower portion becomes nearly hemispherical : margin forming a thick parapet, the inner edge of which is crenate, and separated from the tentacles by a narrow fosse. Surface smooth, entirely invested with a thin slimy epidermis, which is easily rubbed off, and quickly renewed. Substance firm and coriaceous ; perfectly opaque.

Disk. Nearly circular, entire, ample, membranous, flat or slightly convex : radii fine but distinct.

Tentacles. About 120, set in four rows, of which the outermost contains 32; the others one or two less : they are short, thick, cylindrical, with knobbed tips, diverse among themselves. The knobs of the outermost row are little wider than the stems, they are sub-conical, or kidney-shaped, seemingly formed of two lobes, with a round tubercle seated on the inner face just below the knob. Of the second row the knobs consist of two swellings divided by a constriction, each swelling composed of two globose lobes placed side by side, with a mucro terminating the whole. Of the two innermost rows the knobs are nearly sessile; they are rondo-quadrangular, or shaped somewhat like a loaf of bread. In the expanded state all these organs lie nearly horizontal, pointing outwards, and slightly overlapping the parapet.



TENTACLES OF A. HETEROCERA.

Mouth. Slit-like, coarsely furrowed. Stomach-wall capable of protrusion, so as to conceal the whole disk.

COLOUR.

Column. A rich apricot-yellow, which here resides in the epidermis, for when this is rubbed off, the colour is white, but when renewed the colour returns.

Disk. Pellucid white, with fine opaque white radii.

Tentacles. Pellucid white, faintly tinged with red, and tipped with opaque white.

Mouth. Lips deep buff.

SIZE.

Diameter and height of column about an inch; expanse the same.

LOCALITY.

The south of England and south-west of Ireland: deep water.

This fine species, only inferior in beauty to the one just described, was dredged by Mr. W. Thompson in Weymouth Bay,—eight fathoms, gravel,—in September, 1853. As I was at Weymouth at the time, he kindly showed it to me, and I thus had the opportunity of making careful drawings and notes from the life. We considered it as more nearly allied to *Corynactis* than to any other recognised form; and, the species *augusta* being then unknown, I was induced to suggest the specific name *heterocera*, which Mr. Thompson adopted, from ἕτερος, diverse, and κέρας, a horn.

In confinement, the species appeared hardy. When detached it readily adhered again; soon expanded after having been provoked to close; often passing from one condition to the other many times in quick succession. It is subject to very little change of shape, in this respect contrasting with *Corynactis*, which is most protean. Mr. Thompson observed that it opened slowly, exserting the tentacles of one-fourth of the periphery, while the rest remained closed. These organs were nearly motionless.

When a piece of meat was dropped on the open disk, it remained awhile apparently unnoticed; at length the animal slowly bent itself on one side, and the unwelcome morsel rolled across the tentacles and fell to the bottom.

When Dr. E. P. Wright was on the south-west coast of Ireland, in July, 1858, he found, at Crookhaven, a small number of specimens of this species, agreeing with Mr. Thompson's description in every particular, except their smaller size. He kindly sent me three, but they all died *in transitu*, from the length of the journey. Dr. Wright says "it can assume an almost transparent appearance,"—which was not the case with the Weymouth specimens; but which assimilates it to *Corynactis.* He observed also that the outer tentacles were reverted, so as actually to touch the rock, which gave it a strange aspect.

The circles of tentacles resemble a coronet of pearls; and searching for a name by which to distinguish the genus, I was reminded, by this peculiarity, of the diadem which was the distinctive badge of the Roman *Augusti*, and by the splendid colours of the animals, of the no less imperial gold and purple. I have therefore called it *Aureliania*, after him who of the Roman emperors first wore the diadem and the gold-embroidered purple.* The splendid appearance of the zoophytes, especially of the preceding species, must plead my apology for so presumptuous an appropriation.

Weymouth, *W. T.* (w.): Crookhaven, *E. P. W.*

augusta.

HETEROCERA.

Corynactis.

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* "Iste primus [scil. Aurelianus], apud Romanos, diadema capiti innexuit, gemmisque et auratâ omni veste, . . . usus est." (Aurel. Vict.)

GENUS III. CORYNACTIS (ALLMAN).

Base expanded, adherent.

Column versatile, tall; the margin forming a parapet, with no fosse. Surface smooth, without suckers or loopholes; not invested with any separable epidermis. Substance fleshy or pulpy, pellucid.

Disk flat, entire, circular.

Tentacles in several rows, all of the same form; each consisting of a conical stem and a globular head: perfectly retractile.

Mouth simple, protrusile; lip coarsely furrowed: stomach evertile.

Only one British species exists, *C. viridis.*

THE GLOBEHORN.

Corynactis viridis.

PLATE IX. *Figs.* 1—5.

Specific Character. Rarely exceeding half an inch in height; transparent; tentacles very unequal.

Corynactis viridis. ALLMAN, Ann. Nat. Hist. Ser. 1, xvii. 417; pl. xi. JOHNSTON, Brit. Zooph. Ed. 2, i. 205; pl. xxxv. figs. 10, 11. COCKS, Rep. Cornw. Soc. 1851, 3; pl. i. figs. 3—5. M. EDWARDS, Hist. Corall. i. 258.

Allmanni. THOMPSON, in Johnst. Br. Zooph. Ed. 2, i. 474; fig. 85. COCKS, Rep. Cornw. Soc. 1851, 4; pl. i. fig. 6. GOSSE, Dev. Coast, 422; pl. viii. figs. 8—10. IBID. Man. Mar. Zool. i. 28; fig. 39. E. P. WRIGHT Nat. Hist. Rev. vi. 122; pl. xiii.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks and shells; generally broader than column; its outline sometimes slightly undulate

Column. Pillar-like, very variable in height and shape; the margin forming a distinct parapet or terrace, crenated within, but not separated from the tentacles by a fosse. Surface smooth, or slightly furrowed, lubricous. Substance pulpy, transparent.

Disk. Circular, never waved, often greatly exceeding the column, flat or slightly concave; smooth, with the radii marked, but no gonidial distinction.

Tentacles. Upwards of 100, set in four rows,—16, 24, 32, 32, = 104; the outer rows largest; each composed of a more or less pillar-like or conical stem, and a globular head: in the inner rows, the stem is very short, and the head nearly sessile. The outer rows usually diverge upward and outward, projecting over the margin, and not seldom hang downward.

Mouth. Protrusile at pleasure into a truncate cone or cylinder, surrounded by a thick lip strongly furrowed, like the mouth of a cowry-shell. No trace of gonidial tubercles, or grooves.

COLOUR.

Column. A yellow emerald-green, becoming far richer and more opaque at the margin.

Disk. Transparent, with the radii brilliant emerald-green.

Tentacles. Stems with dark umber-brown warts on a transparent colourless ground: heads rich rose-pink.

Mouth. Emerald-green.

SIZE.

Seldom exceeding half an inch in height, and three-eighths of an inch in diameter of disk.

LOCALITY.

The south-west coasts of England, Scotland, and Ireland: deep water, and between tide-marks.

VARIETIES.

α. *Smaragdina*. The condition above detailed, which was the one first described, and is by far the most abundant. (Pl. ix. fig. 5.)

β. *Rhodoprasina*. Column and disk rosy-lilac; margin emerald-green; tentacles, stem umber, head pearl-white. (Fig. 1.)

γ. *Tephrina*. Column and disk pearl-grey; margin faint emerald; tentacle-stem and head dull wood-brown. (Fig. 3.)

δ. *Chrysochlorina*. Column pale yellow-green below, blending above into orange; margin rich orange; disk emerald-green; tentacle-stem maronne (or white), head pearl-white; lip scarlet-orange. (Fig. 2.)

ε. *Prasococcina*. Column and disk pellucid pearl-grey, flushed with scarlet; margin emerald; tentacle-stem and head pale scarlet.

ζ. *Corallina*. Column brownish scarlet, margin orange-scarlet; disk scarlet; tentacle-stem and head pearl-white; lip scarlet (or white). (Fig. 4.)

η. *Coina*. Wholly pure white, translucent; the margin, lip, and tentacle-heads opaque.

This is one of the most exquisitely lovely little gems of the aquarium; and fortunately it is abundant on our south-western shores, and very easily preserved in confinement for an indefinite period. In the Channel Islands; from Torquay around the promontory of Cornwall to Ilfracombe in the Bristol Channel; and again on the indented coast of Cork, it occurs in profusion on the perpendicular and overhanging rocks; while it has been dredged in deep water off various points of the same shores, and even in the landlocked gulfs on the north-east of Ireland. It is almost invariably found in close-set clusters of a dozen to fifty; and though several distinct varieties frequently occur in the same immediate vicinity, yet the individuals of the same group are invariably found to agree in their tints. Hence I incline to believe that these groups are produced either by the spontaneous fission,* or the gemmation of a primitive polype. I have seen some which were evidently connected together by the base, the process of separation being incomplete.

It is somewhat difficult to detach the animals; their bodies are excessively pulpy and tender, and under irritation they excrete a vast quantity of mucus, so dense as almost to equal in consistency the substance of their own bodies, and which might sometimes assume the form of an epidermis. If carefully detached, however, they will re-adhere; and I have known individuals even crawl off from a fragment of rock to the sides of the tank. In general, however, they are stationary, and even sluggish; allowing their tentacles to be handled without contracting. They open very freely, and ordinarily remain expanded.

In a well established aquarium, they will live for a long period; I have some which have lived in captivity fifteen months. They seem in other respects tenacious of life; for I have seen the tentacles and margin of one side apparently healthy and contractile, while the whole opposite side had become a putrescent mucus, sloughing away.

All the varieties are charming; perhaps none more so than the translucent white one which I have named *Coina*.

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* Several in the possession of Mr. Holdsworth spontaneously divided.

The expanded disk, with the opaque white tentacle-heads scattered over it, looks like what the ladies call "spotted muslin;" while, under a lens, the tentacle-stems resemble lace, or figured blonde.

Around Torquay the species exists in much variety. On the shadowed sides of the perpendicular wall-like rocks, near Meadfoot, I have seen, at extreme low water, countless groups, displaying their lovely little coronets within reach of my hand, as I was pushed in a small boat through the narrow passes of the islets. Dr. E. P. Wright finds it in amazing profusion, "covering whole rock-pools," at Crookhaven. He says that some of these expanded to nearly an inch in diameter,—dimensions which far exceed those of such as I have seen. They have been occasionally found on roots of *Laminaria*, and Mr. Cocks has taken a number, half-digested, from the stomach of a Plaice.

They feed readily on minute morsels of raw meat; which, however, must be laid on the disk with great caution, or the animal will close. In taking-in the morsel the *Corynactis* does not protrude the lips to embrace it, nor close the tentacles over it, like the *Actiniæ*, but dilates the mouth slowly and uniformly, until the lips form a circle of great width, nearly as wide, indeed, as the disk, within which the visceral cavity, like a broad saucer, is seen, with the coiled *craspeda* lining its sides and bottom. Into this gaping cavity the morsel is drawn, and then the lips gradually contract and embrace it, finally protruding in a pouting cone. This is exactly the manner of *Caryophyllia Smithii.*

There is much in the appearance of this animal which agrees with *Caryophyllia:* the colours and their distribution, the general translucency of the tissues, the form and crenation of the mouth, and, in particular, the shape, arrangement, and minute structure of the tentacles, are so exactly those of the Coral, that I have often more than half suspected that the former is the immature condition of the latter. Both are found in the same localities, in the same haunts, and often in close proximity, which helps the conjecture. No trace of calcareous deposit is found in the tissues of *Corynactis* when crushed between plates of glass; but the observations of Mrs. Thynne* have shown that the young of *Caryophyllia* attain a large size without depositing a *corallum*. But the results of this lady's experiments,—so far as they go,—tend to negative the identity of the two animals; though I must still consider the species as in near affinity.

Under the microscope the tentacle is seen to consist of a transparent thick-walled tubular *stem*, in which longitudinal fibres are conspicuous, and a globose *head*. The stem is studded with large oval warts, varying in shape and size, and without orderly arrangement, but set transversely on the whole, very close together in contraction, but separated by wide spaces when the tentacle is elongated. Both the head and the warts are pellucid in themselves, but are sub-opaque from their contents: both are thickly covered with *palpocils*, while the transparent portions of the stem are clothed with *cilia*.

In conformity with the great predominance of the longitudinal over the annular muscular fibres in the tentacle-wall, the contraction of these organs is in length rather than in diameter; or at least that of the diameter is only the result of elongation. The globose head seems non-contractile; and hence, when the stem is much elongated, we see a spherule at the tip of a narrow foot-stalk, while, when the form is much contracted, the head remaining unchanged, we have the "corrugated cup" of Mr. Peach, with the sphere seated as it were in it.

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* Annals Nat. Hist. for June, 1859.

The *cnidæ* in this species attain a higher development than in any other zoophyte that I am acquainted with, and hence they afford peculiar facilities for the study of these interesting organs.

No one *familiar* with this beautiful little creature can for a moment doubt that the two supposed species, *viridis* and *Allmanni*, are in truth but one. The former name must of course be retained, as having the claim of priority. It was given by the discoverer, Professor Allman, who found it, where since it has been so abundantly met with by Dr. E. P. Wright. The name *Corynactis* is formed from κορύνη, a club, and ἀκτὶς, a ray.

There are several exotic species, whose tentacles are tipped with globose knobs;—as *Act. globulosa* (Quoy et Gaim.), *A. globulifera* (Ehrenb.), and *A. clavigera* (Dana); but I know too little of their structure to pronounce upon their degree of affinity with the present. The *clavigera*, a species of large size from the Pacific Islands, may perhaps be a link of connexion between *Corynactis* and *Sagartia*.

Guernsey, *T. D. H.:* Torquay, *P. H. G.:* Dartmouth, *E. W. H. H.:* Plymouth, *G. D.:* Fowey, Polruan, Goram Haven, *C. W. P.:* Falmouth, *W. P. C.:* Lundy, *C. K.:* Ilfracombe, *P. H. G.:* Cumbrae, *D. R.:* Crookhaven, *G. J. Allman:* Bantry Bay, Ventry, *E. P. W.:* Strangford Lough, *W. T.:* Belfast Bay, *G. C. Hyndman.*

Aureliania.
VIRIDIS. [clavigera.]
Caryophyllia. Sagartia.

FAMILY II.—ZOANTHIDÆ.

The polypes in this family are persistently fixed, and aggregated: the adherent base extending itself laterally, and sending up new polypes at intervals, which remain permanently united to each other, and to the primary polype. The extension may be in irregular lines, carrying the polypes in single file; in broad bands, supporting several abreast; or in all directions, producing large clustered masses, incrusting the foreign body to which they happen to be adherent.

This variation in the manner of base-extension has been hitherto considered as so important, that genera have been constituted on this character alone,—*Zoanthus*, including those whose base runs in lines; *Palythoa*, such as form carpet-like surfaces. But evidence will presently be adduced to show that these variations may occur in the same species. Again, the genera *Mammilifera* and *Corticifera*, of Lesueur, have been formed for clustered species; the former being fleshy, with a mucous surface, not enveloped in sand; the latter "inclosed in cellules of sand, agglutinated; the cellules themselves agglutinated for their whole length, and forming a corticiferous expansion." It appears, however, from Lesueur's own description, that what he considered "cellules," inhabited by the animals, was simply the integument of each polype, in which sand was imbedded. The presence or absence of sand, however, can in no wise be allowed to constitute a generic distinction. I cannot, therefore, recognise in the family more than the single genus, *Zoanthus*.

GENUS I. ZOANTHUS (Cuvier).

Actinia (Ellis).
Zoantha }
Palythoa } (Lamouroux).
Zoanthus }
Mammilifera } (Lesueur).
Corticifera }
Sidisia (J. E. Gray).

Base permanently attached; spreading over rocks, stones, or shells, in either a linear or incrusting manner.

Column pillar-like, higher than wide; margin cut into strongly marked teeth, which are united by a thin membrane. Surface smooth, excreting a mucus, in which occasionally grains of sand become imbedded, constituting an adventitious epidermis.

Disk slightly concave; radii inconspicuous.

Tentacles conical, pointed, similar in structure to those of Astræacea: wholly retractile.

Mouth more or less protrusile, simple.

ANALYSIS OF BRITISH SPECIES.

Invested with sand; extension various	*Couchii.*
Without sand—	
Polypes cylindrical, olive; several abreast	*sulcatus.*
Polypes obconic, pellucid white; in single file	*Alderi.*

THE SANDY CREEPLET.

Zoanthus Couchii.

PLATE IX. *Figs.* 9, 10; X. *Fig.* 5.

Specific Character. Basal band extending variously; polypes invested with a sandy coating; tentacles in two rows.

Zoanthus Couchii.	JOHNSTON, Brit. Zooph. Ed. 2, i. 202; pl. xxxv. fig. 9. COUCH, Corn. Faun. iii. 73; pl. xv. fig. 3. HOLDSWORTH, Proc. Zool. Soc. 1858; pl. x. figs. 3—7.
Dysidea (?) *papillosa.*	JOHNSTON, Brit. Sponges, 190, fig. 18; pl. xvi. figs. 6, 7.
Sidisia Barleei.	J. E. GRAY, Ann. N. H. Ser. 3, ii. 489; Proc. Zool. Soc. 1858; pl. x. fig. 8.

GENERAL DESCRIPTION.

FORM.

Basal band. Narrow, irregularly creeping, soft, elastic, fleshy to the feel, very sensitive; invested with sand, like the column.

Column. Cylindrical, rising to about three or four times its diameter; smooth, transparent. Margin cut into twelve or fourteen (generally the latter number) large fleshy triangular teeth, which are connected by a thin web of transparent membrane, the inner layer of which is composed of transverse fibres, the outer is granular and cutaneous. In a state of semi-contraction, these teeth form strongly-marked converging ridges on the flat summit of the column.

Investment. Fine sand, evidently not a secretion, but extraneous, imbedded in the epidermis,—the fragments (in Torquay specimens) being of different colours, some being of white limestone, others of red sandstone. When the column is much distended, the grains of sand become considerably separated, and we can distinctly see through the transparent and smooth integuments into the visceral cavity. Thus the sand forms manifestly only a single layer. Only very minute grains are used, and there is very little difference in their size.

Disk. Generally flat or slightly concave, but protrusile in a conical form. Radii apparently distinct, but only because the upper edges of the *septa* appear through the perfectly transparent disk.

Tentacles. Twenty-eight (twenty-four in less mature specimens), arranged in two rows, fourteen in each: those of the inner row correspond to the marginal teeth, those of the outer are intermediate. They are sub-equal, taper, bluntly pointed, and, when extended, about equal in length to the diameter of the column, hollow, not warted, with thick walls, which, in contraction, fall into transverse or annular corrugations. They are protruded in a brush, but, when fully expanded, spread out horizontally.

Mouth. Lip sharp, much crenated, protruded after feeding.

COLOUR.

Investment of root-band and column. Pale brown, the hue of the sand.

Column. Beneath the investment, transparent and colourless.

Disk. Pellucid reddish-grey, dusted with excessively minute white specks.

Tentacles. Translucent, nearly colourless; but each has a small mass of opaque white pigment on the internal surface, just at the tip: the aggregation of white points has a pretty effect.

Mouth. Lip opaque white.

SIZE.

None that I have seen alive exceeded one-eighth of an inch in diameter, and about thrice that height in extension. In contraction the button is usually about a line in height. Mr. Holdsworth has obtained specimens much larger than these.

LOCALITY.

The extreme northern and southern points of the British Islands, Northumberland, and various other points of our coast; deep water; on stones and shells, and free on the sea-bottom.

VARIETIES.

α. *Linearis.* The condition above described, in which the root-band creeps in a narrow ribbon over stones and shells. Cornwall and Devon. (Plate x. fig. 5.)

β. *Diffusus.* The root-band spread over the surface of a shell as a continuous carpet, whence the polypes spring, irregularly crowded together. Northumberland. (Plate ix. fig. 10.)

γ. *Liber.* Unattached. The root-band forming a free cylinder, exactly resembling the column of the polype, and of the same diameter. The polypes in this case branch irregularly from the cylinder, and terminate both its extremities. Shetland. (Plate ix. fig. 9.)

If we selected a single specimen of each of these varieties, and compared them, without any other information, nothing would be more manifest than that we must assign them not only to distinct species, but even to distinct genera. Mr. Alder has favoured me with many specimens, obtained by Mr. Barlee, at Shetland, some of which, each consisting of several full-grown polypes, are perfectly independent and compact, showing not the slightest trace of adhesion to any foreign body, nor of any part that can be distinguished as a root-band. Thus, in the specimen figured in Plate ix. fig. 9, three polypes diverge from a common centre; others are similarly formed, sometimes with a triangular dilatation of the point of divergence, which thus becomes flat, but still with both surfaces equally entire. I have not seen more than three polypes on any free specimen.

But among these, we see specimens at first sight hardly distinguishable from them, except by a slight globosity at the point of divergence: when we turn these over, we discover that the globosity has been moulded on a minute shell, evidently that of a *Natica*. Then others occur, in which the shell, almost always a *Natica*, is larger, and there is a distinct basal carpet uniformly spread over it, of the sand-covered flesh, from which spring four or more polypes: these are manifestly identical with the free ones. But on larger shells the colony of polypes is made up of more individuals; in one specimen before me, in which the shell is about the size of *Natica Alderi*, there are nineteen polypes. In every case the basal carpet has spread in uniform thickness over the entire shell, following the form accurately, and extending to the edge of the outer lip, and clothing the rotundity of the inner lip as far as the eye can follow it. Strange to say, *in every example*, the shell itself has wholly disappeared, and all that is left is the exact model of it in the sand-clothed membrane, or basal carpet, of the polype.

In this condition, the zoophyte was mistaken by Dr. G. Johnston for a Sponge, and he has accordingly figured and described it in his "British Sponges," under the name of *Dysidea papillosa.* I do not see in what single particular such specimens differ from the genus *Palythoa* of Lamouroux, as this is characterized by M. Milne Edwards:—"*Polypiéroïdes cylindriques, naissant sur une expansion basilaire membraniforme, libres latéralement, ou soudés entre eux, et formant des masses encroûtantes;*"* and thus we find the same species in some circumstances a *Zoanthus*, in others a *Palythoa.* Nay, more, as if to increase the confusion, Dr. J. E. Gray has actually made a new genus for the intermediate free condition, which he calls "*Sidisia.*"†

The only way in which I can account for the free condition is by supposing that the germ was, in those cases, deposited on a fragment of shell or stone so minute as to be completely overspread and enveloped by the increasing base.‡ The unvarying disappearance of the shell in the diffuse variety is more remarkable, and seems to imply a corrosive or absorbent power in the base.

That the Shetland and Northumberland specimens are identical with ours in Torbay seems pretty certain; for Mr. Alder, who has had opportunities of seeing both in the living state (some from the north having been sent him alive by Mr. Barlee, and some from the south by myself), can see no specific diversity between them. But that they are the same species as the *Zoanthus Couchii* of the Cornish coast, I assume rather than prove. It is unlikely that there should be two species of the same uncommon genus, having so many points in common, found in so close proximity as the Devon and Cornwall coasts, and yet there are glaring discrepancies between Mr. R. Q. Couch's published descriptions and the characters of our animal. He describes the surface as "glandular," the form as frequently "contracted to an hour-glass shape," and as being very versatile; the habit as sluggish, and slow to change; the tentacles as "darker at the extremities than at the base;" not one of which particulars do our specimens confirm.

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* Hist. des Coralliaires, i. 301. † Annals Nat. Hist. Dec. 1858.

‡ Mr. Alder remarks on these varying conditions as follows:—"I have come to the conclusion that when the zoophyte has free space on a stone it runs over it as *Zoanthus;* but when the base is confined to a shell, it spreads into an uniform crust, as *Palythoa.* The loose branched specimens, I conclude, having affixed themselves to some minute object not affording a proper base of attachment, take a tubular form until they terminate in polypes."—*(In litt.)*

My first personal acquaintance with the species I owed to Mr. Holdsworth, who dredged several colonies in twelve fathoms, off the Ore Stone, near Torquay, in October, 1858, where further researches show it to be quite common. They were of the variety *linearis*, affixed to fragments of slate and old valves of *Cardium rusticum*, twenty or thirty polypes on each, running in sinuous bands from half a line to three lines apart in the series. The colonies meandered over both surfaces of the fragments.

One of these colonies my friend kindly gave to me, and it has lived now ten months with me. The polypes are by no means sluggish, but are continually opening and closing with considerable vivacity. When completely contracted, each polype is a cylindrical button, with the summit round and depressed in the centre. As expansion proceeds, the centre evolves, and the summit becomes nearly flat, with the twelve or fourteen strongly marked marginal ridges radiating from the central orifice. The central aperture enlarges, and the white tips of the tentacles are seen protruding, and presently the tentacles themselves, blunt and pellucid white, which soon arch outwardly.

They feed readily on raw flesh or earthworms, but will take only very minute fragments. These, however light their contact, cause the tentacles to retract; but if the morsel be laid gently on the truncate summit of the closed column, the converging teeth appearing, it will remain there until the animal seizes it. The tentacles are protruded one by one so cautiously that the meat is not disturbed, and soon we discern that it is environed by a wall of tentacles, and that the mouth is gaping widely to embrace it.

After feeding, or when food which has been resting on the disk is suddenly taken away, the whole disk is protruded as a cone, on the summit of which the open throat forms a wide valley, coarsely furrowed.

The creeping-band is very sensitive; when touched with a needle-point, all the polypes suddenly contract, yet not quite simultaneously, but in the order of succession corresponding to their proximity to the point of attack.

Mr. Holdsworth tells me that "the polypes live very well when detached from their support."

The generic name is formed from *ζῶον*, an animal, and *ἄνθος*, a flower; the English term is meant to express its peculiar habit.

Shetland, *G. Barlee:* Northumberland, *J. A.:* Guernsey, *J. A.:* Torquay, *E. W. H. H.:* Cornwall (throughout), *R. Q. C.:* Strangford Lough, *W. T.*

ASTRÆACEA.

ZOANTHUS.

CARYOPHYLLIACEA.

THE FURROWED CREEPLET.

Zoanthus sulcatus.

(Sp. nov.)

PLATE IX. *Fig.* 7.

Specific Character. Upper half of column free from sand, and indented with longitudinal furrows.

GENERAL DESCRIPTION.

FORM.

Basal band. Broad, with an irregularly sinuous outline, and offshoots, often bearing three polypes abreast; loosely invested with coarse sand.

Column. Generally cylindrical, but versatile, sometimes hour-glass shaped, springing out of a membranous epidermis, which tightly invests it, and holds a few grains of very fine sand imbedded in it. When extended, the column rises free and smooth out of this, which then reaches to about one-third of the height. Surface marked with twenty-two (in immature specimens twenty) longitudinal sulci, most conspicuous towards the summit: in the button state this is rounded, with a central depression, where the sulci meet. Each *alternate intersulcus* forms a marginal tooth.

Disk. Saucer-shaped; radii not conspicuous.

Tentacles. Equal in number with the intersulci, with which they correspond, in two rows, the inner row to the marginal teeth, the outer intermediate. Sub-equal, conical, pointed, usually radiating horizontally.

Mouth. Not raised on a cone.

COLOUR.

Column. Dull uniform olive: each intersulcus having a blackish spot near its summit; and each tooth is silvery white.

Disk. Yellow-olive; but invariably more or less studded with very minute grains of white sand, which seem fixed, and look like silver filings. Aggregations of these grains specially occur at the bases of the secondary tentacles, omitting the primary ones.

Tentacles. Perfectly colourless and transparent, with spherical granules of yellow-brown pigment, set like pavement on the interior surface of the wall, generally in contact, yet here and there leaving large spaces altogether unoccupied. The colour of the column and disk is evidently formed by similar granules, but in uninterrupted contact.

SIZE.

Column about one-eighth of an inch high, and one-twelfth wide.

LOCALITY.

Torbay; on rock, between tide-marks.

This very distinct and interesting little *Zoanthus* occurred in a large colony at Broadsands, near Brixham, in March, 1859. They were spread on a rock of soft red sandstone, and so numerously, that, in the fragment which came into my possession, I counted sixty polypes in a space of one-and-a-half inch square. At first their character was much disguised by the crowded sand-tubes of a very minute *Terebella*, out of the tangled masses of which the *Zoanthi* were peeping. When these were cleared away by the careful application of a needle-point and a hair-pencil, the basal expansion was apparent, an irregular broad band, with several polypes abreast, as described above. The texture of the band appears less compact than in the preceding species, with which I compared it, having a more cellular appearance; the grains of sand too are coarser.

The species is hardy, my specimens being healthy at the present time, after three months' captivity. They are evidently diurnal in their habits and predilections, generally expanding under the stimulus of sunlight, but always closing at night. When the polype is irritated it shrinks nearly to the epidermis, and from the whole summit throws off a mucus, which presently becomes membranous, and seems identical with the epidermis.

Couchii.
[Solanderi.]
SULCATUS.
Phellia.

THE WRINKLED CREEPLET.

Zoanthus Alderi.

(Sp. nov.)

PLATE IX. *Fig.* 8.

Specific Character. Polypes free from sand; set in single file, obconic, transversely wrinkled.

GENERAL DESCRIPTION.

FORM.

Basal band. Narrow, smooth, irregularly branching, free from sand.

Column. Inversely conical, the summit being two or more times as broad as the base; summit (in the button state) swelling, flat, depressed in the centre, with many (about twenty?) radiating *striæ*, indicating the marginal teeth. Surface smooth, without any investment of sand, but marked throughout with close-set transverse or annular wrinkles.

Disk and *Tentacles.* Unknown.

COLOUR.

Basal band and *column.* Opaque milk-white.

SIZE.

Height of column about two lines; greatest diameter about half a line.

LOCALITY.

Northumberland: on a stone, at extreme low-water.

The slight acquaintance that I possess with this species I owe to Mr. Joshua Alder, who has sent me a drawing and description of a specimen found by him at Cullercoats, at a very low spring-tide, in the summer of 1857. My friend favours me with the following note of the capture:—"It was soft and fleshy, without trace of *corallum;* the individuals connected by a creeping fibre running over the under surface of the stone. I chipped a piece of it off, which fell face-downwards, and I fancy got injured in consequence; as it never showed any signs of life after I put it into my bottle. I kept it two or three days in expectation that it might recover, but, as it began to decay, I secured the remainder by putting it into spirit."

There were about a dozen polypes in the colony, all of the same size, which seems to be good evidence that they had attained adult dimensions.

Couchii.
ALDERI.
——— ?
Sarcodictyon.

FAMILY III.—TURBINOLIADÆ.

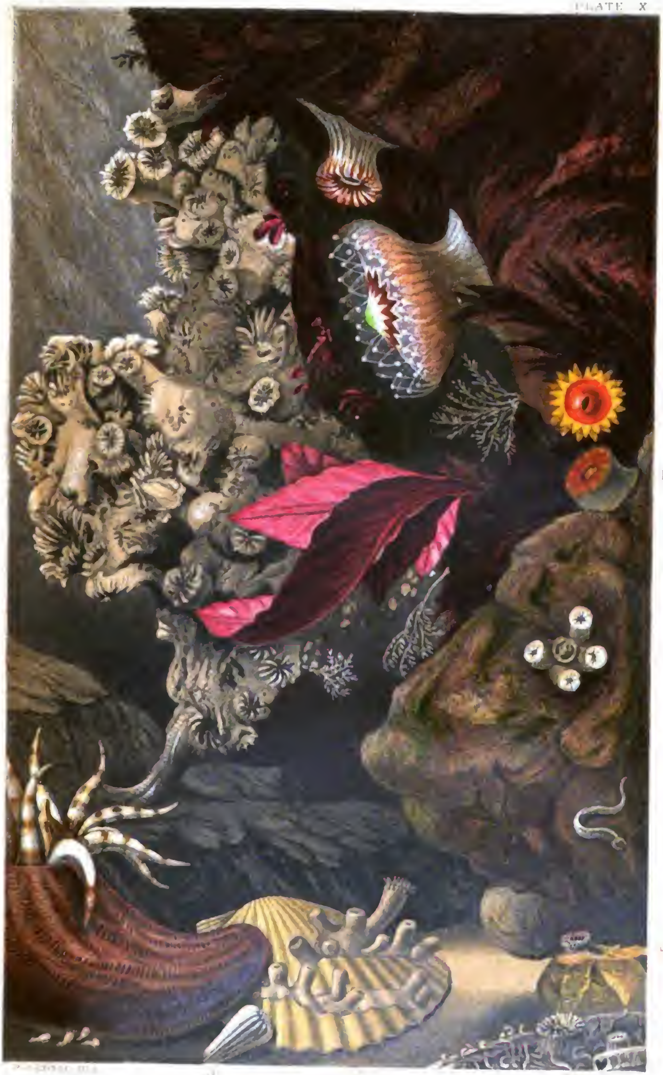
In this, and all the families which have now to come under consideration, the tissues secrete calcareous matter, which unites into a solid internal skeleton of stone, known as the CORALLUM. The stony substance is chiefly deposited —1. in the integuments of the base and column, forming the WALL (*murus*); 2. in the septa, forming a series of perpendicular PLATES (*lamellæ*), which radiate inward from the wall; and, in some cases, another circle, or circles, of similar plates, PALULES (*pali*), which do not reach the wall; and 3. (as I believe) in the ovarian mesenteries, forming a series of plates, generally twisted, in the bottom of the cavity, called the COLUMELLA. The hollow centre, formed by the upper edges of the plates, is called the CALICE (*calyx*). Sometimes the exterior of the wall is furnished with longitudinal RIBS (*costæ*), which correspond to the plates.

The plates are arranged in CYCLES: those of the *first* cycle project furthest inwards; those of the *second* bisect the interspaces; those of the *third* bisect the interspaces thus formed, and so on. The whole of the plates developed in one primary interspace constitutes a SYSTEM.

In the TURBINOLIADÆ the *corallum* is solid (not porous), simple, with the lamellar interspaces reaching to the bottom of the cavity, and perfectly free. The plates are highly developed, simple, and generally have a granular surface. The ribs are well-marked.

ANALYSIS OF BRITISH GENERA.

With *palules :* adherent.	
Palules in a single circle : *columella* of many slender twisted plates	*Caryophyllia.*
Palules in several circles : *columella* broad and irregular in form	*Paracyathus.*
Without *palules :* free.	
Columella a single plate	*Sphenotrochus.*
Columella absent	*Ulocyathus.*



1 LOPHELIA PROLIFERA
2 PEACHIA TRIPHYLLA
3 SPHENOTROCHUS WRIGHTII
4 S [illegible] MAC ANDREWANUS
5 [illegible]
6 PARACYATHUS TAXILIANUS
7 P [illegible]
8 P [illegible]
9 PHYLLANGIA AMERICANA
10 BALANOPHYLLIA REGIA
11 CYATHINA SMITHII

GENUS I. CARYOPHYLLIA (LAMARCK).

Cyathina (EHRENB.).

Corallum simple, generally obconic, often with an expanded base, permanently adherent; outline ovate or circular.

Columella composed of several thin, narrow, twisted, vertical plates.

Palules broad, entire, in a single circle.

Plates straight, broad, projecting, and forming six systems.

Ribs straight, developed only towards the summit, granulated.

The *animal* (for so we may conventionally term the soft tissues, though it is to be remembered that the *corallum* is an essential part of the living body) is, so far as we know it, translucent, the column very extensile, the disk protrusile, the tentacles set in several rows, diminishing in size from the outer row inward, each consisting of a stem with a globular head.

I know but one British species, *C. Smithii*.

THE DEVONSHIRE CUP-CORAL.

Caryophyllia Smithii.

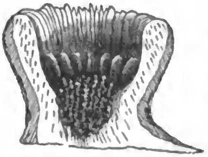
PLATE X. *Figs.* 12, 13.*

Specific Character. Plates in five cycles; base broad; outline generally ovate; height not exceeding the long diameter.

Caryophyllia Smithii.	STOKES, Zool. Journ. iii. 481; pl. xiii. figs. 1—6. BUCKLAND, Bridgew. Tr. ii. 90; pl. liv. figs. 9—11. JOHNSTON, Br. Zooph. Ed. 2, 198; pl. xxxv. figs. 4—8. COUCH, Corn. Fauna, iii. 72; pl. xii. fig. 3. GOSSE, Dev. Coast, 108; pl. v. figs. 1—5. M. EDWARDS, Hist. Corall. ii. 14.
cyathus.	FLEMING, Brit Anim. 508.
sessilis.	BELLAMY, So. Devon, 267; pl. xviii.
? *Turbinolia borealis.*	FLEMING, Brit. Anim. 509.
Cyathina Smithii.	DANA, Zooph. 371. M. EDWARDS and HAIME, Ann. Sci. Nat. Ser. 3, ix. 288. GOSSE, Man. Mar. Zool. i. 33; fig. 50.

GENERAL DESCRIPTION.

CORALLUM.



CARYOPHYLLIA SMITHII
(slightly magnified).
Section of corallum.

Corallum. Simple, constricted in various degrees; the base generally wider than the summit. and the central region being often less than half the diameter of the latter. Outline sometimes circular, but generally more or less elliptical. Height in general less than the long diameter.

Ribs. Well-marked on the upper half, less distinct on the lower, studded with fine granules.

Plates. Forming five cycles, and six systems, but the plates of the fifth cycle are wanting in some of the systems. They are broad, granular on both surfaces, with the upper edge very salient and rounded in outline. Those of the third and fourth cycles subequal between themselves, and much smaller than the first and second, which also are mutually subequal.

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* Marked in the Plate "*Cyathina Smithii.*"

Columella. From twelve to twenty thin plates much twisted, with sinuous edges; the summits much lower than the *palules.*

Palules. Well-developed, more flexuous than the *septa*, of which they correspond to the third cycle.

Colour. In general pure white, but in some specimens tinged with a lovely permanent rose-tint.

ANIMAL.

FORM.

Column. Cylindrical, very extensile, smooth, membranous, invected towards the summit, each invection becoming a tentacle, without any distinct margin.

Disk. Flat, but readily assuming a conical form. No trace of gonidial radii, tubercles, or groove.

Tentacles. About fifty in number, arranged in three subequal rows: stem conical, membranous, translucent, studded with transverse oblong warts; head globose, opaque, covered with palpocils. (Plate xii. fig. 4.)

Mouth. A lengthened ellipse or a slit. Lip coarsely furrowed, like the lips of a cowry-shell. Stomach flat when empty, as in Anemones.

All the tissues can be enormously distended with water.

COLOUR.

Column. A very faint bay or fawn colour, with longitudinal lines of chestnut.

Disk. Transparent white, with a broad Vandyked circle of rich chestnut surrounding the mouth.

Tentacles. Stem-wall colourless, with the warts deep chestnut; head opaque, pearl-white, sometimes slightly tinged with rose.

Mouth. Pure white.

SIZE.

Corallum. Fine specimens attain a diameter of three-fourths of an inch, and a height nearly as great.

Animal The column when distended frequently stands an inch above the *corallum*, and exceeds it in breadth by a sixth of an inch on every side; the tentacles augment the height still further by nearly half an inch.

LOCALITY.

On various parts of our coast in deep water, attached to stones and shells: Devon and Cornwall, on rocks between tide-marks.

VARIETIES.

α. *Castanea.* As above described.

β. *Esmeralda.* The chestnut here replaced by vivid green in like intensity, except the border of the mouth, which is pale red.

γ. *Clara.* Translucent white.

On the perpendicular surfaces of cliffs with a northern aspect, in narrow wall-sided fissures, and on the under sides of fallen fragments of rock forming natural arches, and in dark overhung tide-pools, I have found this beautiful Coral in abundance on the coast of both North and South Devon. It is only at the great recesses of the equinoctial spring-tides that it is exposed, though in permanent pools of ample dimensions it occasionally occurs at the half-tide level. For the most part gregarious in habit, it occurs more in colonies than singly, and twenty, thirty, and even more, are occasionally taken by the collectors from a single pool.

It is deservedly a favourite with aquarians; for if removed from the rock with care by a proper use of the chisel, scarcely any species is more hardy, more beautiful, or more changeable in its aspects. I have been informed of a specimen which had been preserved two and a half years, and was then in health. It is free in expanding in captivity; perhaps its most common condition being that in which the mouth is somewhat open, and the tentacle-heads just peeping from beneath the half-closed margin of the column; but occasionally, and especially at night, the animal expands to the full, and rears its lovely form far above the level of its stony walls. This condition may, however, at any time be induced by a proffer of food; an atom of raw flesh cautiously laid on the half-exposed disk is a temptation too great to be resisted. The protrusile lip slowly but evenly expands to embrace the food, and then closes over it, meeting in a puckered knot in the centre. The unyielding stony margin of the machal cavity preventing the morsel from being drawn down, as it would be in an *Actinia*, the whole disk projects perpendicularly, like a thick pillar, from amidst the tentacles, displaying the dark mass through the pellucid walls.

Now presently a great change takes place: the whole of the soft tissues become distended with water, and take on an exquisite translucency and delicacy; the column swells out to twice the width of the *corallum*, the tentacles are like transparent bladders full of water, each crowned by its little white globule, and the whole appearance is most beautiful. I have seen under these circumstances the animal extended to more than an inch and a half above the level of the plates. The lip often projects like a thin oval wall, or like the brickwork surrounding a well; marked with thick perpendicular ridges of opaque white, distinctly defined, separated by interspaces of equal width. This is well expressed in the figures (5 and 6) given by Johnston, after Alder, which are very accurate: figs. 7 and 8 of the same plate, like too many of the zoophytic delineations of Forbes, I can only call caricatures.

I have elsewhere* given many details of the structure and economy of this Coral, to which I can here only refer the reader. Among them will be found some curious examples of reproductive power; one, in the formation of a new disk, mouth, and tentacles, at the lower end of the *corallum*, which had been broken from its base; and another, of the replacement of a large number of the *septa*, which had been broken away.

Of the generation and development of the species I can say nothing from personal observation; the smallest I have seen having been about one-sixth of an inch in diameter, with a well-formed *corallum* of half a line in height.

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* Devonshire Coast, pp. 108—127.

Mr. R. Q. Couch, however, says, "In the youngest state the animal is naked, and measures about the fifteenth of an inch in diameter, and about the thirty-second of an inch in height. In the earliest state in which I have seen the calcareous polypidom there were four small rays, which were free or unconnected [*i.e.* without any *wall*] down to the base; in others I have noticed six primary rays, but in every case they were unconnected with each other. Other rays soon make their appearance between those first formed; they are mere calcareous specks at first, but afterwards increase in size. The first union of the rays is observed as a small calcareous rim at the base of the polype, which afterwards increases both in height and diameter with the age of the animal."*

From a valuable series of observations made by Mrs. Thynne,† it would appear that the *Caryophyllia* discharges its ova in spring, which in about two days become rotating infusorioid animalcules. In a week or two these affix themselves, and develop tentacles and a disk, and gradually grow to the size, and even far more than the size, of the parent, with all the characteristic colours and marks, ***but without the least trace of a corallum.*** During the progress of this condition, the individuals increase rapidly by spontaneous fission, the separated portions immediately becoming independent animals. It is difficult to suggest any flaw in the evidence of identity; but it is to be regretted that the experiments terminated without any sign of the development of a *corallum.*

Double and even triple specimens are not uncommon; and I have seen at least two examples (one of which I now possess) that are fourfold.‡ The appearance of such specimens is exactly that of a branching coral; and, strange to say, if one alone of the disks be fed, the rest will presently become equally distended, as if partaking of a common life. On breaking one of these double skeletons, however, no communication is found to exist between the cavities; and hence we must conclude that such instances are due to the accidental fixation of two or more gemmules in close proximity to each other, and the coalescence of the calcareous walls in process of growth.

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* Quoted in Johnston's Br. Zooph. i. 199.
† Ann. N. H. for June, 1859.
‡ Such a specimen I have figured in my Dev. Coast, pl. v. fig. 5.

The name Caryophyllia is formed of *κάρυον*, a nut, and *φύλλον*, a leaf,—*q.d.* "a nut of leaves" = plates. The specific name is in honour of Thomas Smith, who appears to have first observed it on the south coast of Devon.

A curious little Barnacle (*Pyrgoma Anglicum*) is parasitic on this species, affixing itself to the outer edge of the plates; two are sometimes found on the same coral.

The *corallum* is very hard. An hour's rubbing of one on a slab of marble rough from the saw, with a view to a longitudinal section, produced little effect on the coral, though it effectually polished the marble.

The following list of habitats show that the species is widely scattered around our coasts.

Shetland (deep-water), *Fleming:* Moray Firth (d. w.), *W. G.:* Guernsey (low-water), *T. D. H.:* Torquay (l. w. abundant, d. w. rare), *P. H. G.:* Dartmouth (l. w.), *E. W. H. H.:* Cornwall (l. w. abundant), *R. Q. C.:* Ilfracombe (l. w. abundant), *P. H. G.:* Oban, *J. A.:* Larne (d. w.), *G. D.* (B.): Lambay, *R. Ball:* Dalkey Sound (l. w.) *R. B.:* Wexford Bay, *W. M'Calla:* Nymph Bank (d. w.), *W. T.:* Youghal, *R. B.:* Bantry Bay (l. w. common), *E. P. W.:* Connemara, *W. M'C.:* Bundoran, *R. B.:* Lough Swilly (d. w.), *G. D.* (B.): Lough Foyle (d. w.) *G. D.* (B.)

Corynactis.
SMITHII.
[cyathus].

GENUS II. PARACYATHUS (M. EDW. & HAIME).

Corallum simple, subturbinate or cylindrical, with an expanded base, permanently adherent.

Columella very broad, terminated by a papillous surface, and formed by processes that appear to arise from the lower part of the inner edge of the *septa.*

Palules of divers orders, forming two or more circles; in general lobed at the summit, narrow, tall, and appearing also to arise from the lower part of the inner edge of the *septa,* their size diminishing as they approach the *columella.*

Plates nearly equal, very slightly salient, and closely set; their lateral surfaces strongly granulated, and sometimes presenting traces of imperfect dissepiments. They form four or five cycles, and the systems are equally developed.

Ribs nearly equal, straight, closely set, projecting very little, and delicately granulated.

ANALYSIS OF BRITISH SPECIES.

Plates forming five imperfect cycles: cup elliptical . . .	***Taxilianus.***
Plates forming four imperfect cycles : cup circular . . .	
Ribs obsolete below	***Thulensis.***
Ribs very salient below	***pteropus.***

THE MORAY CUP-CORAL.

Paracyathus Taxilianus.

(Sp. nov.)

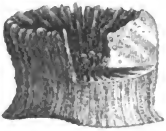
PLATE X. *Fig.* 6.

Specific Character. Plates in five imperfect cycles; calice elliptical; ribs notched above, granulous below.

GENERAL DESCRIPTION.

Corallum. Slightly turbinate, adhering by a base broader than any other part, a little diminishing towards mid-height, and widening gently above and below. Wall thin. Height about equal to the *medium* diameter.

Ribs. Distinct from base to margin; on the upper half prominent, thin, with a rather sharp, but irregularly notched edge, separated by intercostal furrows of about twice their width; on the lower half forming low rounded ridges, crowned with conical granules, set in two or three irregular longitudinal rows; all are nearly alike in every respect.



P. TAXILIANUS *(magnified). A portion cut away to show the plates.*

Calice. Elliptical; the axes as 24 : 31.

Plates. Forming five cycles and six systems; but those of the fifth cycle are wholly wanting in three systems, and present in both halves of the other three. Not very close-set, not very salient, thin, very little thickened externally, the highest point of their edge a little within the margin, whence it slopes very slightly inward and downward, in an undulate line, ending with an abrupt angle, whence the inner edge descends perpendicularly: the entire edge rises into irregular eminences and blunt points, and both surfaces are roughened with coarse granules.

Columella. Formed of two or three much twisted lamellæ, with broad rounded lobes, rising from the united *palules.*

Palules. Thin, waved, lobed and granulate, like the *septa;* those of the tertiary *septa* large; the others inconspicuous, and only here and there discernible; united in the centre into an irregularly waved and perforated horizontal plate.

SIZE.

Diameter of long axis, ·31 inch; of short axis, ·24; height ·21 to ·14, unequal because the *corallum* is built partly on a shell and partly on a *Serpula* tube adhering to it.

ANIMAL. Unknown.

LOCALITY.

The Moray Firth; deep water.

It is with some doubt that I refer this and the two following species to the genus *Paracyathus*. Generally agreeing with its characters, they all have the peculiarity of the union of the *palules* into a horizontal perforate platform, which does not appear to be the case with any of the hitherto described species.

The single specimen on which the above description is founded was forwarded to me by my kind friend, Mr. Gregor, of Macduff, who obtained it from deep water. It is affixed to the inside of an old valve of *Cyprina Islandica*, and has the appearance of being recent.

The only species of *Paracyathus* with which this is likely to be confounded is the fossil *P. crassus* of the London Clay; but from this it may be distinguished by the union of the *palules*, by the ribs being proportionally thinner and more remote, and by the diversity of their upper and lower portions.

Paracyathus is derived from *παρὰ*, near, and *κύαθος*, a cup (the element of *Cyathina*). I have assigned a specific name from *Taxilium*, the ancient appellation of the promontory now called Kinnaird's Head, off which the specimen was taken.

Caryophyllia.
Taxilianus.
crassus.

THE SHETLAND CUP-CORAL.

Paracyathus Thulensis.

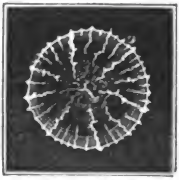
(Sp. nov.)

Plate X. *Fig.* 8.

Specific Character. Plates in four imperfect cycles; calice circular; height equal to half the diameter.

GENERAL DESCRIPTION.

Corallum. Slightly turbinate, adhering by a base, which, though broad, is the narrowest part. Height about half the diameter.



P. THULENSIS
(magnified).
Vertical aspect of corallum.

Ribs. Prominent on upper half, becoming obsolete below; their edges set with tooth-like conical tubercles; separated by intercostal furrows, which on the whole equal the ribs in width, but both are irregular.

Calice. Circular, shallow.

Plates. Forming four cycles and six systems; those of the fourth cycle wanting in the halves of four systems, and present in both halves of the other two. Rather wide apart, moderately salient, rather thick, scarcely thickened externally; outline of their upper edge forming a flattened arch, but not uniformly, in some the highest point being at the margin, in others far within; inner edge nearly perpendicular: entire edge set with irregular eminences and blunt points: both surfaces studded with coarse granules.

Columella. A single flexuous plate with a somewhat tri-radiate summit, united below to the *palules.*

Palules. Indistinct, being confluent, and sending off horizontal traverses to the *septa,* so as to form an irregular perforated horizontal lamina, whence the *columella* rises.

Size.

Diameter ·19 inch; height ·1.

Animal. Unknown.

LOCALITY.

Shetland Isles; Moray Firth; deep water.

Looking over the cabinet of Dr. Howden, of Montrose, last winter, my eye fell on this little Coral, which seemed new to me. Its owner was so kind as to transfer it to my possession, when, on careful examination, it proved to be an unrecognised species, with the characters above enumerated. It may be distinguished from *P. caryophyllus* by the relative proportion of the height to the diameter, and from all other described species by the number of septal cycles.

Dr. Howden dredged the specimen off Ord Head in Bressai Sound, Shetland, in thirty or forty fathoms, on a bottom of small stones, to one of which it is attached.

In March of the present year Mr. Gregor sent me, on a valve of *Lutraria*, a specimen, which appears to be of the same species, but of younger age. It is not more than half the size of the former, but in other particulars agrees sufficiently. On my putting it into sea-water on its arrival, the pellucid flesh came up and filled the intersepts, giving satisfactory evidence of its freshness. Unfortunately it had been sent through the post, packed dry; it was probably alive when despatched. The whole *corallum* in this specimen is of the purest translucent whiteness. It came up on a fisherman's line from the Moray Firth, in about forty fathoms, hard bottom.

The specific name is from Thule, the ancient designation, as presumed, of the Shetland Isles.

Taxilianus.
THULENSIS.
pteropus.

THE WINGED CUP-CORAL.

Paracyathus pteropus.

(Sp. nov.)

PLATE X. *Fig.* 7.

Specific Character. Plates in four imperfect cycles; calice circular; ribs very salient, dilating into wings below; height less than half the diameter.

GENERAL DESCRIPTION.

Corallum. Cylindrical, adhering by the entire breadth; height less than half the diameter.

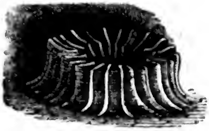
Ribs. Thin, nearly straight, sub-equal, separated by intercostal spaces about thrice their width, very salient throughout, but from the middle downward developing into triangular buttresses, the long lower edges of which are adherent to the support, so that the area inclosed by their points is far wider than that inclosed by the wall: their whole surface, as well as that of the intercostal spaces, has a slightly carious, but glossy appearance, not exactly granular.

Calice. Circular, shallow; the margin in the same plane.

Plates. Forming four cycles and six equal systems, those of the fourth cycle wanting in half of each system. They are wide apart, being separated by twice or thrice their own thickness, thin, salient, but unequally so, some of the primaries and secondaries rising to twice the height, above the wall, of the tertiaries, but others are more nearly equal; their planes are more or less waved, and their surfaces set with scattered blunt eminences: upper edge truncate, nearly horizontal, but slightly declining inwards, and rising with an abrupt blunt point at the inner edge, which then descends perpendicularly.

Columella. A single flexuous plate, united below to the *palules.*

Palules. Distinct, united to the inner edges of the primary and secondary plates, and to some (not all) of the tertiary: they are thick, very sinuous, their surfaces set with rounded eminences, and their upper edges much lobed; they are united by their inner edges into an irregular horizontal platform, out of the centre of which rises the *columella.*



P. PTEROPUS
(corallum magnified).

SIZE.

Diameter from wall to wall ·13 inch: height ·05.

ANIMAL. Unknown.

LOCALITY.

The Moray Firth, deep water.

For this very distinct and remarkable little Coral I am indebted to Mr. James Macdonald, of Elgin, who obtained it from Lossiemouth, in October, 1858, attached to a valve of *Cyprina*, from the deepest part of the Moray Firth. There is no other species with which it can possibly be confounded, the expansions of the ribs presenting a very striking character. They remind me of the immense buttresses which surround the base of the giant Ceiba of the Jamaican forests. To this feature I have alluded in the specific name, which is formed from πτερὸν, a wing, and ποῦς, a foot.

My friends, Messrs. Macdonald and Gregor, speak of other Corals having at various times come under their notice, but they had always been set down, like these now recorded, as *Caryophyllia Smithii*. It is by no means improbable that further research may considerably augment the list of our living Corals.

Thulensis.
PTEROPUS.

GENUS III.

SPHENOTROCHUS (M. EDW. & HAIME).

Turbinolia (LAMARCK).

Corallum simple, free, with no trace of adherence, wedge-shaped, the superior extremity wider in all directions than the inferior; transversely elliptical.

Columella, a single lamina, occupying the greater axis of the *calice:* its upper margin flexuous and bilobate.

Palules entirely wanting.

Plates extending to the *columella,* or meeting in the centre of the visceral chamber; broad, slightly salient, forming three cycles, and six systems.

Ribs broad, not very prominent, in general crisped, or represented by a series of papillous tubercles.

ANALYSIS OF BRITISH SPECIES.

Corallum uniformly diminishing downward; ribs smooth .	*Macandrewanus.*
Corallum pedicellate, with swelling nodes; ribs crisped .	*Wrightii.*

THE SMOOTH-RIBBED WEDGE-CORAL.

Sphenotrochus Macandrewanus.

PLATE X. *Fig.* 4.

Specific Character. Corallum uniformly diminishing downward; ribs smooth, not salient; edge of calice plane.

Turbinolia milletiana.	THOMPSON, Annals N. H. Ser. 1. xviii. 394. JOHNSTON, Br. Zooph. Ed. 2, i. 196; pl. xxxv. figs. 1—3. E. P. WRIGHT, N. H. Rev. vi. 122. GOSSE, Man. Mar. Zool. i. 32; fig. 49.
Sphenotrochus Andrewianus.	M. EDWARDS and HAIME, Ann. d. Sci. Nat. Ser. 3. ix. 243; pl. vii. fig. 4.
Macandrewanus.	M. EDWARDS, Hist. des Corall. ii. 70.

GENERAL DESCRIPTION.

Corallum. An inverted cone, compressed, lengthened, straight, with the inferior extremity forming a wedge-like blunt point.

Ribs. Perfectly straight, smooth, nearly equal throughout, or slightly enlarged above, separated by intercostal spaces about twice as wide as themselves, moderately prominent, continued round the edge of the scar where the corallum was originally attached.

Calice. The edges on the same horizontal plane; outline elliptical, in the ratio of 100 : 120.

Plates. Twenty-four; in three complete and well-developed cycles, close-set, straight, thick at the margin, and gradually thinning towards the centre of the calice; salient, arched at their upper edge, with a surface very slightly granulose. The primaries and secondaries are subequal and similar, and hence the appearance of twelve systems; each of these is united with the columella by two diverging laminæ, as if the plate were split at its inner edge, and the two halves separated.

Columella. A single, thin, vertical lamina.

SIZE.

Height half an inch; diameter of calice one-fourth of an inch by one-fifth.

ANIMAL. Undescribed.

LOCALITY.

The coasts of Cornwall and Galway: deep water.

I am sorry that I can give no information about this species additional to what is already known, viz., that it exists in a living state on our coasts, and that the skeleton is preserved in cabinets. That in the British Museum is the only one that I have seen. As long as naturalists content themselves with merely preserving the skeletons of the animals they meet with, but little progress can be made in a knowledge of their history.*

The present species is said to have been dredged alive off Scilly, by Mr. MacAndrew, after whom it has been named, and off Arran, on the west coast of Ireland, by Mr. Barlee. The generic name is from σφὴν, a wedge, and τροχὸς, a top, in allusion to the form of the corallum.

S. milletianus, with which this has been confounded, is a fossil of the miocene period, with a thicker point, and a more elliptical calice.

intermedius (*foss.*).
MACANDREWANUS.
[Roëmeri (*foss.*).]

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* M. Milne Edwards has fallen (Hist. Corall. ii. 70) into the strange inadvertence of supposing that the figure given by Johnston (Br. Zooph. Ed. 2, pl. xxxv. fig. 7), of the living animal, belongs to this species; though the text distinctly says it is a *Caryophyllia Smithii*. The figure is poor enough, it is true.

THE KNOTTED WEDGE-CORAL.

Sphenotrochus Wrightii.

PLATE X. *Fig.* 3.

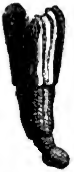
Specific Character. Corallum pedicellate, with swelling nodes; ribs papilliferous on the body, and crossed with zig-zag folds on the pedicel.

Sphenotrochus Wrightii. GOSSE, Nat. Hist. Review, vi. 161; pl. xvii. figs. 1—4.

GENERAL DESCRIPTION.

Corallum. Simple, straight (or else with the base considerably curved laterally), compressed above (the axes of the disk being 60 : 42 in general; in one example, however, 60 : 50), but rounded in the lower two-thirds, pedicellate; the body and the pedicel varying exceedingly in their relative proportions, the former being to the latter as 1 : 5 in one example; in another, as 1 : 1; in another, as 1 : 1·2,—no two of the four specimens in my possession being alike in this respect. The pedicel is surrounded by four to six constrictions, varying greatly in their relative distance: these separate nodes are more or less swollen, of which one, a little above the base, is usually more ventricose than the rest; the pedicel generally enlarges upwards, but its distinction from the body is marked by an abrupt shoulder.

Ribs. About as wide as the interspaces, distinctly traceable only as far down as the termination of the body; their course is irregularly angular; the primaries and secondaries terminate at the shoulder in prominent knobs. On the pedicel only the six primaries are distinguishable, and these are then crossed by numerous strongly indented zig-zag folds, of which the higher angle is on the rib, the lower in the interspace. All the ribs of the body-region are studded with irregularly projecting points or papillary eminences.


S. WRIGHTII *(magnified).*

Base. A small but distinct circular cavity, into which the extremities of the six primary ribs project.

Calice. Considerably arched, the short axis being much the higher; rather deep.

Plates. Twenty-four, in three cycles; the lateral primaries and secondaries more developed than the terminal ones; moderately close-set, irregularly bent in their planes, thick exteriorly, suddenly diminishing just within the wall, and thence gradually becoming thinner. The primaries and secondaries equal in height and breadth; the tertiaries much lower; all salient, the upper edge obliquely truncate, sloping down from the margin inward. The two plates which form the short axis are united to the columella by diverging laminæ; but this structure appears to be wanting in the others. The surfaces of all the plates are rough, with scattered papillary points.

Columella. Bent at each end towards one (the same) side; its upper edge thickened in irregular swellings. In some specimens it is not visible from above.

SIZE (of four examples).

NO.	LONG AXIS.	SHORT AXIS.	HEIGHT.
1	0·08 inch	0·062	0·155
2	0·06 „	0·042	0·140
3	0·06 „	0·050	0·110
4	0·06 „	0.042	0·144

ANIMAL. Unknown.

LOCALITY.

North-east coast of Ireland: deep water.

This species resembles *S. crispus* in its zig-zag folds, but has more agreement with *S. mixtus* in its general characters. In its tendency to a curved form, however, as well as in its pedicellate character, and especially in the presence of a well-formed basal area, which appears to have been a point of adhesion, it displays so much affinity with *Ceratotrochus* (according to the diagnosis of M. Milne Edwards) that I was at first disposed to assign it to that genus.

The four specimens that I have above described have been entrusted to me by my kind friend, Dr. E. Perceval Wright, of the Dublin University, with whose name I have honoured the species. They were dredged by G. C. Hyndman, Esq., among shell sand, from a turbot bank off the coast of Antrim, in 1852.

I have introduced the tiny form into this work, believing it to be an existing, and not a fossil species. Professor

Milne Edwards, indeed, considers the *Sphenotrochi* with papillate and crisped ribs to be in no case later than the eocene deposits; while those with smooth ribs he looks upon as invariably belonging to higher strata, and reaching to the present period: but this is a canon which a new species may at any moment overturn, if it be not already subverted by the *S. nanus* (Lea) of the eocene of Alabama. Dr. E. P. Wright mentions, as a suspicious circumstance, that many pleistocene shells do exist in the bed of shelly sand, where these specimens were found. But this does not confirm Professor Milne Edwards's rule; for, so far as that could decide the question, it would prove not only that this crisped Coral is not recent, but that it is certainly as old as the miocene.

Dr. Wright says:—"I have reason to think, however, that they are not fossil;" and the same is my own impression, though I can scarcely assign any definite grounds for it, except the fresh appearance of one or two of the specimens. Some of them are rubbed, and one is polished externally.

The uniformity in size of the individuals, and the full development of the plates, indicate a probability that, minute as they are, they have attained adult age.

[mixtus (*foss.*).]
[crispus (*foss.*).]
WRIGHTII.
[Ceratotrochus (*foss.*).]

GENUS IV. ULOCYATHUS (Sars).

Flabellum (Gray).

Corallum simple, free, turbinate, with traces of adherence (in the young state) on a very short wedge-shaped crooked pointed base.

Columella and *palules* entirely wanting.

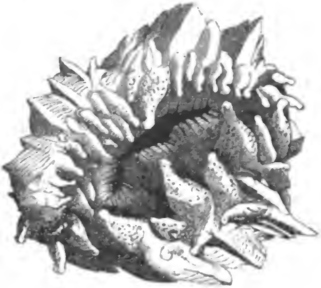
Ribs not at all prominent, sometimes obscure.

Plates very thin, high, very salient above the margin of the cup, distinct throughout their length.

Calice very deep; the margin sinuous and crisped.

Animal resembling that of *Caryophyllia*.

Only one species has been recognised, *U. arcticus.*



ULOCYATHUS ARCTICUS
(after Sars) slightly magnified.

THE SCARLET CRISP-CORAL.

Ulocyathus arcticus.

Specific Character. Base triangular and flat, bounded by a sharp edge: calice round.

Ulocyathus arcticus. SARS, Fauna Litt. Norv. ii. 73; pl. x. figs. 18—27.

Flabellum MacAndrewi. J. E. GRAY, Proc. Zool. Soc. May, 1849: pl. ii. figs. 10, 11.

GENERAL DESCRIPTION.

CORALLUM.

Corallum. Simple, free, but with traces of having been adherent in infancy: the base with a great inferior surface, triangular, flat, often concave, separated from the superior surface, which is equally triangular and convex, by a sharp edge on each side.

Ribs. Large, often indistinct, unequal; the primaries sometimes armed with minute tubercles.

Calice. Very wide and deep; the edge almost circular, crisped with minute sinuosities.

Plates. These are so irregular that it is difficult to count the cycles, but they are at least four. Those of the first and second are more than twice as high as the rest, and reach to the centre of the cup, where they unite, but irregularly: the others are lower and shorter in gradation, the lowest projecting little within the margin. All are perfectly separate throughout, extremely thin, sharp-edged, the surfaces set with minute granules often running in curved lines: the free edge of all is arched, and their greatest width is one-third from the summit. The primaries and secondaries are very salient, and the edge of the calice seen in profile forms eleven or twelve triangular lobes.

Columella and *palules* wholly wanting.

ANIMAL.

FORM.

Column. Actinia-like, without any trace of gemmæ.

Disk. Radii fine, distinct.

Tentacles. About 140, in four rows, close-set, irregular; the innermost three or four times as large as the outermost: stem cylindro-conical,

covered with large round prominent warts; head globose, smooth, imperforate; very contractile, but not retractile.

Mouth. **A wide slit in the direction of the long axis: lip crenate, with forty to sixty-five deep furrows.**

COLOUR.

A brilliant orange-scarlet; a little lighter on the inner tentacles: the furrows of the lip intense blood-red.

SIZE.

Corallum. **About one and a half inch in diameter, and a little less in height.**

LOCALITY.

The coasts of Norway and Shetland: deep water.

Of this species, by far the largest and noblest of the simple European Corals, a specimen was dredged by Mr. MacAndrew about twenty-five miles off East Shetland, in ninety fathoms. The individual was broken by the dredge, and only a portion of the corallum was secured, which is now in the British Museum. There can be no doubt, however, of its identity.

A considerable number of examples have been obtained by Mr. Sars at Oxfjord, close to North Cape, the extreme northern point of Europe. It lives at an amazing depth, even from 150 to 200 fathoms, where the pressure of the superincumbent water must be immense. Clear as are the waters of the northern seas, so vast a volume of water must surely absorb nearly the whole of the rays of light, and the rich hues of the animal are therefore the more remarkable. It lies free on the mud or clay, never having occurred with evidence of recent attachment.

The generic name is formed from *οὖλος*, crisped, and *κύαθος*, a cup.

[Desmophyllum.]
ARCTICUS.
[Flabellum.]

FAMILY IV.—OCULINADÆ.

The corallum in this family is solid (not porous), compound, increasing by gemmation so as to take a form more or less branching and tree-like. The stony tissue is very compact, the surface smooth, delicately striate near the calices, or but slightly granular. The walls of the *corallites* (or stony skeletons of the individual polypes) are not perforate, not distinct from the common tissue (*cœnenchyma*), and increase by their inner surface, so as gradually to fill up the cavity from below upwards. The interseptal chambers are only imperfectly divided by a few *dissepiments*, or horizontal projections of stony matter shot across. The plates (*septa*) are entire, or have the upper edge slightly divided; they are well developed, and are few in number.

We have but one native representative of this family, the genus *Lophohelia*.

GENUS I. LOPHOHELIA (M. EDW. & HAIME).

Madrepora (LINN.).
Oculina (LAMARCK).
Lithodendron (SCHWEIGGER).

Corallum tree-like, or forming a branching thicket, the branches coalescing; the form results from a gemmation irregularly alternate and sub-terminal. There is no true *cœnenchyma,* but the walls are very thick, scarcely ribbed.

Calices having a deep cavity, with a reverted lamellar edge.

Columella and *palules* wanting.

Plates entire, salient, unequal, the principal ones united towards the lower part of their inner edges, at the bottom of the visceral cavity.

There is but one known British species, *L. prolifera.*

THE TUFT-CORAL.

Lophohelia prolifera.

Plate X. *Fig.* 1 (*reduced*).

Specific Character. Corallites cylindrical.

Madrepora prolifera.	Linn. Syst. Nat. Ed. 12, 1281. Ellis and Solander, Zooph. pl. xxxii. figs. 2—5. Esper, Pflanz. i. 104; Madr. pl. xi.
Lithodendron proliferum.	Schweigger, Handb. der Nat. 416.
Oculina prolifera.	Lamarck, An. s. verteb. ii. 286. Lamour. Exp. méth. 64; pl. xxxii. figs. 2—5. Dana, Zooph. 393.
Lophohelia prolifera.	M. Edw. and Haime, Ann. des Sci. Nat. Ser. 3. xiii. 81. M. Edw. Hist. Corall. ii. 117.

GENERAL DESCRIPTION.

Corallum. Forming a massive, compact, many-branched tree, rising from a slender base, permanently attached to rocks.

Corallites. Free laterally, in general budding only once or twice, cylindrical, or but slightly expanding at the summit, moderately long. Exterior surface covered with very minute close-set granules, without ribs, except very faint marginal traces. The margin is often surrounded by a thin lamellar expansion.

Plates. Systems generally unequal and irregular, being formed of seven, or five, or three derived plates, but easily recognisable by following the development of the primaries, which are far greater than the others. The *plates* themselves are thick in the centre and towards the margin, but are thinned off to a sharp edge, which is irregular in outline, but not notched; their surfaces covered with minute granules. The principal ones, from eight to twelve in number, are stouter and far more salient than the rest.

Walls. Very thick and dense, gradually filling up the bottom of the cavities.

Size.

The individual corallites are from one-fourth to half an inch in height and diameter. The dimensions of the compound mass vary according to

age: the specimen figured is about ten inches in height, and seven in diameter.

ANIMAL. Undescribed.

LOCALITY.

The north-western coasts of Europe: deep water.

The figure in Plate X. is taken from a noble specimen, undoubtedly British, reduced to half the natural size. I am indebted for the opportunity of delineating it to the kindness of Professor Dickie, of Belfast, who was at the pains of having several photographs taken from it for my use, and favoured me also with many fragments including perfect corallites. Dr. Dickie informs me that it was obtained from deep water off Skye, in 1852, by means of the deep-sea lines of a fisherman, who presented it to him. He mentions having seen another British example, in the possession of Professor Fleming, the same that the latter exhibited before the Royal Society of Edinburgh in 1846, and which had been taken in the previous summer, by fishermen whose lines had become entangled with it in the sea between the islands of Rum and Eig. This specimen, which weighs six pounds, is preserved in the Museum of King's College, Aberdeen. A third example is alluded to by Johnston, who was informed by E. Forbes that certain published figures of the species "had recalled to his mind a very large specimen in the possession of Dr. Edmonstone of Orkney." It is to be regretted that we possess no information of the living animal of so fine a Coral, the only British example of the truly dendroid species.

The name *Lophohelia* is formed from λόφος, a tuft, and ἥλιος, the sun; *q. d.* "a tuft of suns," alluding to the radiating plates of the corallites.

[Acrohelia.]
LOPHOHELIA.
[Amphihelia.]

FAMILY V.—ANGIADÆ.

The visceral cavity of the corallum in this family is not obliterated, nor even subdivided; the interseptal dissepiments being merely rudimentary. There is no *cœnenchyma*, and the wall is imperforate.

The plates have notched edges, but not very conspicuously.

The corallum is massive. It increases by gemmation; the buds being developed on stolons, or on basal membraniform expansions.

The corallites are not united by their sides, except accidentally by means of their walls, and they remain short.

But one British genus is known, *Hoplangia.*

GENUS I. HOPLANGIA (GOSSE).

Phyllangia (GOSSE).

Corallum incrusting foreign bodies.

Corallites rather short, formed by buds which spring from an expansion around the base of the parent, permanently united to it (but not to each other) by the inferior portions of their walls.

Wall surrounded by a thin porcellanous coat (*epitheca*), which permits the ribs to be traced through it; granulate.

Ribs thin, sharp, low, very unequally distinct.

Columella a broad surface of rough papillæ, merging into the plates.

Palules wanting.

Plates thin, scarcely salient, unequal, straight, granulose, toothed on the edges, except the upper edges of the primaries, which are nearly entire.

There is but one species, *H. Durotrix*.

THE WEYMOUTH CARPET-CORAL.

Hoplangia Durotrix.

(Sp. nov.)

PLATE X. *Fig.* 9.*

Specific Character. Plates in four imperfect cycles.

Phyllangia Americana. GOSSE, Annals N. H. Ser. 3. ii. 349.

GENERAL DESCRIPTION.

Corallum. Compound, increasing laterally on all sides; low, not rising above the height of the individual corallites; incrusting rocks.

Corallites. Formed by budding from a permanent, thin, calcareous, carpet-like expansion, which spreads around the base of the parent, to which each is permanently united by the inferior portion of the wall. (In the specimen in my possession, four corallites of sub-equal size are grouped around a parent, which has been long dead, for the inner portions of its plates have been worn away.) They are cylindrical, deep, about twice as high as wide, slightly inclining outwards from the common centre.

Wall. Invested by a thin porcelain-like coat of calcareous matter, which appears identical with the basal carpet. It terminates above with a perfectly defined, slightly everted edge, above which the wall is beautifully white and clean, while the *epitheca* is dirty white, and coated with a minute sponge. The epitheca shows traces of periodic growth, by a succession of such everted edges not totally obliterated; and while in one corallite the edge is level with the summits of the plates, in another there is at least one-fourth of the total height above the epitheca. Hence I infer that the wall with the septa makes a periodic growth above the last level of the epitheca, while the latter remains dormant, and that then the epitheca is deposited at once around the new growth; the wall and the epitheca thus growing alternately. The wall is covered with minute scattered granules, and these as well as the ribs can be discerned through the thin epitheca.

Ribs. Thin, sharp, low, in some places discernible only at the very summit of the wall, in others nearly throughout: in the former case they appear again from the edge of the epitheca a little way downward.

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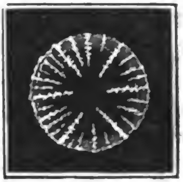
* Marked "*Phyllangia Americana*" in some copies.

Columella. The floor of the cavity is covered with papillary eminences, which are very rough, with irregular points, and are identical with the lower edges of the principal plates, by the convergence of which they seem to be formed.

Plates. Thin above, but increasing in thickness below, scarcely salient, unequal, straight, the surfaces set with irregular granular tubercles, which become increasingly rough and prominent below. The edges are strongly but irregularly notched and toothed, especially below; but the *upper* edge of the *primaries* is for the most part subentire; the form of the outline varies much. There are normally four cycles in six systems: but the fourth cycle is always wanting either in the whole or in half of some of the systems; the amount of defection varying much in different corallites. The development is very unequal, and the plates of the third or fourth cycle are occasionally larger than those of higher rank, *even in the same system.*



HOPLANGIA
(*magnified*).

SIZE.

Individual corallites one-eighth of an inch in diameter, and nearly one fourth in height.

ANIMAL. Undescribed.

LOCALITY.

Weymouth Bay: deep water.

When this neat and interesting little Coral first came into my hands, I thought, notwithstanding some peculiarities, that it must be referred to the *Phyllangia Americana*, a native of the West Indian seas, and so announced it. But I see that there are incongruities which prevent its identification with that or any other recognised genus, and I have therefore founded a new one to receive it. It has much in common with *Angia*, as well as *Phyllangia*, but the above diagnosis will, I think, warrant my decision.

In forming a generic name, I have followed the plan of M. Milne Edwards in using a common element for the genera of a given family; though perhaps a little heterodox for stanch Linneans, it has advantages. Taking then the element *angia*, from ἄγγος, a cup, I have completed the word from ὅπλον, armour; with a double allusion to the mail-like *epitheca*, and the toothing of the plates. The English name commemorates the manner of gemmation; and the specific, the locality in which it was found; the Durotriges having, according to Ptolemy, anciently inhabited the coast of Dorset.

In September, 1858, a dealer from Torquay, dredging in Weymouth Bay, brought up a piece of the bottom, about a foot square, evidently the edge of one of the oolite ledges, torn off by the lip of the dredge. On this were from fifty to a hundred specimens of this little Coral, clustered in many groups. It was presumed to be *Caryophyllia Smithii*, and no special notice being taken of it, the mass was broken up and dispersed; and a small fragment accidentally fell under my eye, and was secured. I was not so fortunate as to see the animal alive, my specimen, though in the flesh, being in an advanced state of decomposition; but the discoverer, who is pretty familiar with *C. Smithii*, at least as to its general appearance, spoke of the *Hoplangia* as resembling that species, and told me that he remarked green and white hues. He observed also numerous tentacles, but did not notice whether they were knobbed.

[Angia.]
HOPLANGIA.
[Phyllangia.]

FAMILY VI.—EUPSAMMIADÆ.

The stony tissue is here deposited in such a manner that the corallum, instead of being compact, is porous, but not so open as to have a spongy texture. The wall is thick, and constitutes the chief part of the whole; it is perforate, and either almost or quite naked, with a granulate vermiculate surface.

The plates are numerous; those of the last cycle always deviate from the radius of the calice, their planes approaching the bisection of their system, so that the whole septal arrangement assumes the form of a six- or twelve-rayed star; by which very remarkable peculiarity this family may be infallibly recognised. The plates are perforate. The interseptal chambers are completely open to the bottom, or divided only by a few incomplete partitions.

There is only one British genus known, *Balanophyllia.*

GENUS I. BALANOPHYLLIA (Wood).

Corallum simple, adherent, sub-pedicellate, cylindrical, or sub-conical.

Columella well-developed, but not projecting at the bottom of the calice; of a sponge-like appearance.

Plates thin, close-set; those of the last cycle well-developed.

Ribs distinct, narrow, nearly equal, crowded.

The Animal is actinia-like, richly coloured, with a protrusile mouth, not conspicuously furrowed, and bluntly-pointed, warted tentacles, without terminal knobs.

There is only one British species, *B. regia*.

THE SCARLET AND GOLD STAR-CORAL.

Balanophyllia regia.

PLATE X. *Figs.* 10, 11.

Specific Character. Corallum sub-conical, circular: epitheca extending to margin: plates in five imperfect cycles.

Balanophyllia regia. GOSSE, Dev. Coast, 399; pl. xxvi. figs. 1—6.
IBID. Man. Mar. Zool. i. 33; fig. 51.

GENERAL DESCRIPTION.

CORALLUM.

Corallum. Conico-cylindrical, rising like the trunk of a tree from a base much broader than the column; height rarely exceeding, often not equalling, the diameter.

Calice. Circular or nearly so: varying much in depth.

Wall. Rather thick, porous, but scarcely spongy, invested with an *epitheca*, which in general extends to the margin, but not always, and occasionally (as in a specimen in my possession) seems wholly wanting.

Ribs. Continuous (not formed of separate granules) but very sinuous, and in some parts branching, the branches so confluent as to form a rough network: they are often distinct through the epitheca.

Columella. Much developed, forming a large spongiose mass (or more like the crumb of well-raised bread), often rising almost to the level of the margin, but more commonly to about half that height.

Plates. Well developed, thick, here and there perforate, with a frosted surface and minutely toothed edges, not salient, the upper edge sloping downward and inward. The star is six-rayed, and is always distinctly formed, and generally symmetrical. There are five cycles, but some of the fourth and fifth are wanting in each system. The gradation in development is pretty regular downward from the first to the fourth; but the fifth are exceedingly irregular and unequal. The two plates of the fifth cycle in each system, which stand next to the primaries (that is, those of the sixth order*), are developed to an extent much exceeding even the primaries themselves, from which they diverge at such an angle that they mutually meet and coalesce at a point about midway between the origin of the secondary of that system and the axis of the calice, but at a level much lower than the margin; the two united plates thence proceed in the intermediate line to join the columella. In many examples, however, this continuation of the united quinaries is obsolete in each alternate system. The quinaries that are contiguous to the secondaries (the 7th order) are also much developed, but not so as to equal the secondaries, with which they often cohere.

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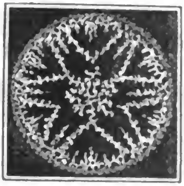
* Hist. des Corall. i. 45.



B. REGIA.

ANIMAL.

FORM.

Column. Cylindrical, extensile, smooth, or somewhat invected.

Disk. Protrusile, in the form of a high truncate cone, on the summit of which is the mouth, without any thickened or furrowed lip. No trace of gonidial radii, tubercles, or grooves. !

Tentacles. About fifty in number, large, conical, obtusely-pointed, without terminal knobs: their walls are translucent, and studded with opaque transversely-oblong warts, which become confluent towards the tip.

COLOUR.

Column and *Disk*. Vivid scarlet in adults, orange in young individuals, opaque.

Tentacles. Gamboge yellow: the hue residing only in the warts.

SIZE.

Diameter of corallum one-fourth of an inch at margin, and occasionally twice as much at base; height from one-sixth to one-fourth. The animal in full expansion may reach one-third of an inch in diameter, and one-half in height.

LOCALITY.

The coast of North Devon: on rocks at extreme low water.

This showy little Coral, interesting not merely for its beauty while alive, but for its peculiar structure when dead, was discovered by myself in 1852. I had been spending a summer at Ilfracombe, and the chills and storms of autumn were already warning the migrant inhabitants away. It was a spring-tide in September, and the water had receded lower than I had seen it since I had been at the place. I was searching among the extremely rugged rocks that run out from the Tunnels, forming walls and pinnacles of dangerous abruptness, with deep, almost inaccessible cavities between. Into one of these, at the very verge of the water, I managed to scramble down; and found round a corner a sort of oblong basin, about ten feet long, in which the water remained, a tide-pool of three feet depth in the middle. The whole concavity of the interior was so smooth that I could find no resting-place for my foot in order to examine it; though the sides, all covered with the pink lichen-like Coralline, and bristling with Laminariæ and Zoophytes, looked so tempting that I walked round and round, reluctant to leave it. At length I fairly stripped, though it was blowing very cold, and jumped in. I had examined a good many things, of which the only novelty was the pretty narrow fronds of *Flustra chartacea* in some abundance, and was just about to come out, when my eye rested on what I at once saw to be a Madrepore, but of an unusual colour, a most refulgent orange. It was detached by means of the hammer, as were several more, which were associated with it. Not suspecting, however, that it was anything more than a variation in colour of that very variable species, *Caryophyllia Smithii*, I left a good many remaining, for which I was afterwards sorry, since they proved to belong to this new and interesting form before us. All were affixed to the perpendicular side of the pool, above the permanent water-mark: and there were some of the common *Caryophylliæ* associated with them.

I afterwards found the same species in considerable number, especially during the very low springs of the

October new moon, among the rocks off the Tunnels, all in the vicinity of the spot where I found the first. They were always in the same circumstances, crowded in colonies; one cavity, just large enough to turn in, containing perhaps a hundred, speckling the walls with their little scarlet disks, near extreme low water. Not one that I took presented the least variation from the characters I had jotted down already; but one specimen had adhering to its base two very young ones, one about a line in diameter, the other not more than one-third of a line. Examination with a lens revealed no difference either in form or colour between these and the adult; the condition of their skeleton is unknown, as I did not choose to destroy the infant specimen, much to my present regret.

Since that time it has been found in considerable abundance along the same line of coast; and it has become common in our aquariums. It is always attractive from its brilliancy, and is moderately hardy, though it appears rather more difficult to keep than *Caryophyllia*.

The integuments are opaque, even when distended: indeed they never become filled with water to anything like the extent which makes the species just named so beautiful. The plates are never visible, during life, in any degree of contraction, the red flesh lying as an opaque cushion over them even when all the tentacles are withdrawn. I am not sure that the disk is ever wholly covered by the inversion of the column; even when the tentacles are quite concealed beneath the margin, the large mouth-cone still protrudes from the central orifice. Sometimes the tentacles sink to very low warts or minute yellow eminences on the scarlet plain that constitutes the disk.

I have said that the epitheca is not unvarying; and I think that the flesh does not extend externally below its edge. One in my possession, however, had the exterior of the corallum wholly clothed with the scarlet integument, even down to the base. The covering was exceedingly thin, for with a needle-point I could feel the stony corallum without any sensible indentation of the surface, and the points at the margin were projecting.

I have no information about the reproduction of the species, except such as may be gathered from the following observation. In the month of September, in a vase in which several specimens were kept, and which contained nothing else to which I could reasonably attribute the phenomenon, I found several clusters of ova. Each cluster consisted of about a dozen, loosely aggregated, and all connected by a kind of twisted cord, which formed a footstalk for each. The eggs were perfectly globular, $\frac{1}{65}$th of an inch in diameter, of a pellucid orange-yellow hue. One of them under the microscope showed the contents granular, and receding from the chorion, with a definite outline. None of them developed the embryo to my knowledge.

The genus was established by Mr. Wood in 1844, to receive a fossil species from the Red Crag of Sutton. It now contains eleven species, most of them fossil, but one exists in the Italian seas, and two others elsewhere. There is none with which *B. regia* can be confounded. The generic name is derived from *βάλανος*, an acorn or nut, and *φύλλον*, a leaf, and the specific alludes to the royal colours in which the animal is arrayed.

Ilfracombe, *P. H. G.*; Lundy, *C. K.*

REGIA.

[cylindrica (*foss.*).]

(?) POCILLOPORA INTERSTINCTA (Müller).

At a meeting of the Royal Society of Edinburgh (Trans. March, 1846), Dr. Fleming exhibited a characteristic drawing of a *Pocillopora* presumed to be of this species, which was obtained by Dr. Hibbert in the Shetland Seas. Dr. Fleming had expected that a detailed description of this would have been published before the appearance of his "History of British Animals," in 1828. It is, however, I believe, still a desideratum.

The genus is marked by the following characters: *Corallum* massive or sub-tree-like, with thick, imperforate walls. *Visceral chambers* divided by well-developed horizontal partitions, or floors, in successive stages. *Plates* rudimentary. *Calices* shallow, with a thick ring at the bottom of each, forming a sort of *columella*.

LUCERNARIADÆ.

Contrary to my original intention, I have determined to exclude this family from my work. Their true affinities are with the *Hydrozoa* and *Medusæ*. The gelatinous texture, the expanded umbrella, the ovaries in the substance of the umbrella, the four-lipped mouth placed at the end of a free peduncle,* and the quadripartite arrangement, are all Medusan characters. The tentacles in marginal groups are found in *Bougainvillæa*, and their form,—knobs at the tip of long footstalks,—agrees more with *Slabberia* than with *Corynactis* and *Caryophyllia*.

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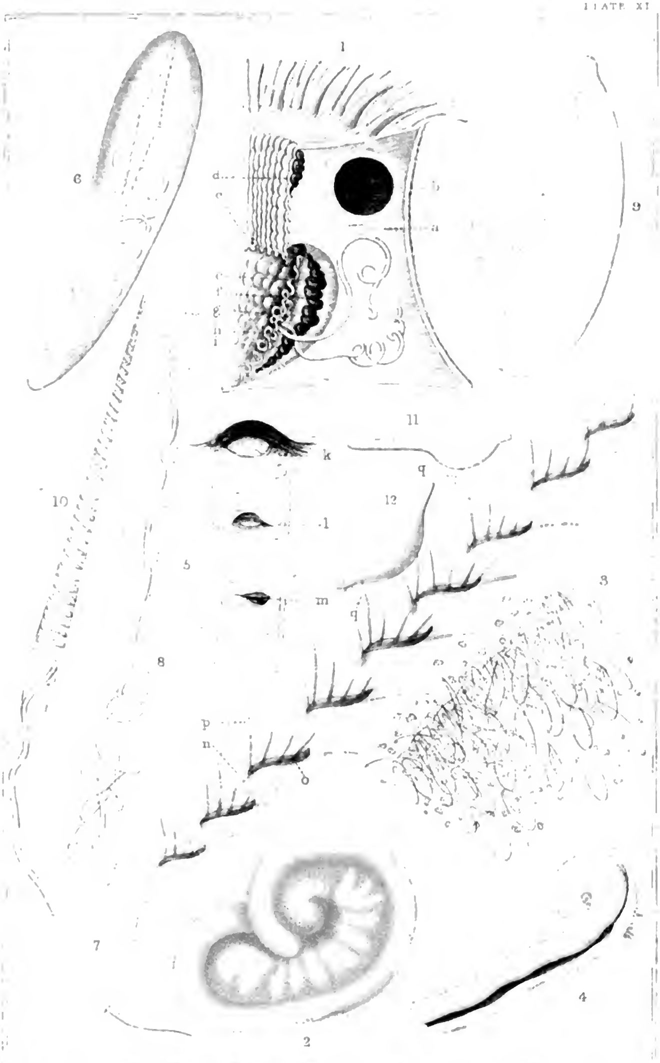
* See my fig. of *Campanularia*, in Devonsh. Coast, p. 296, pl. xviii.

PLATE XI



P. H. GOSSE DEL.

W. DICKES, SC.

ANATOMICAL DETAILS.

APPENDIX.

I.

SPECIES DISCOVERED TOO LATE FOR DESCRIPTION IN THEIR PROPER PLACES IN THIS VOLUME.

ASTRÆACEA. *SAGARTIADÆ.*

THE LATTICED CORKLET.

Phellia Brodricii.

PLATE VIII. *Fig.* 2.

Specific Character. Epidermis free at the margin, dense, transversely corrugated. Tentacles marked with a latticed pattern.

Phellia Brodricii. GOSSE, Annals N. H. Ser. 3. iii. 46.

GENERAL DESCRIPTION.

FORM.

Base. Adherent to rocks; considerably exceeding the column.

Column. Flat and wrinkled when completely contracted: rising to a tall, somewhat slender pillar, studded with low warts on its upper portion, but covered on its lower two-thirds with a tough, firmly adherent epidermis, the upper edge of which is free, with a ragged foliaceous margin, not forming a tube. The surface of this is transversely corrugated, but not warted. The animal frequently expands in its low condition, when the flower occupies the summit of a very low cone, and is not half the diameter of the base. A slight margin, much wrinkled in semi-contraction, and forming a star of radiating furrows in closing.

Disk. Flat or slightly concave; outline circular.

Tentacles. Arranged in five rows, viz. 6, 6, 12, 24, 48 = 96; short and slender, diminishing from the first row outwards; in ordinary extension not longer than one-fourth the diameter of the disk; generally carried arching over the margin, the tips occasionally turned up.

Mouth. Elevated on a strongly marked cone.

Acontia. Not emitted, even under strong irritation, while in my possession. Mr. Brodrick, however, has seen them projected from the mouth.

COLOUR.

Column. Exposed part pellucid white, with the warts opaque white.

Epidermis. Ochreous drab, slightly darker in some parts, with longitudinal white lines proceeding from the base, and vanishing a little way up. Central star of button formed of alternate whitish and blackish rays.

Disk. Drab: each primary and secondary radius marked with two *parallel* lines of dark chocolate-brown; each tertiary radius is similarly but more faintly marked, and the space inclosed is in these latter radii drab on their outer and white on their inner moiety, the divisions of the two colours being marked by a black spot. The space immediately bounding the foot of each primary tentacle dark brown.

Tentacles. Pellucid whitish; the lower half opaque white on the front, crossed by four transverse bars of dusky, the whole (except the lowest one) being connected by three longitudinal lines of the same colour, which impart a latticed or window-like pattern to the tentacle.

Mouth. Lip white; throat white, with black furrows.

SIZE.

Diameter of base nearly an inch, of extended column half an inch, of flower from one-third of an inch to an inch; height one inch.

LOCALITY.

Lundy Island: on rocks at low water.

My acquaintance with this species I owe to the courtesy of William Brodrick, Esq., of Ilfracombe, with whose name I have honoured it. He kindly sent me a specimen in November, 1858, which had at that time been in his possession about sixteen months, having been taken with another individual in the summer of 1857. Its habit is to remain on an exposed stone, without any disposition to roam: it is generally closed by day, or if open the column is contracted; but it elongates in darkness. It is very timid, and cannot on this account be fed: the slightest touch of the tentacles I found to be followed by an instant closing. The light of a candle, concentrated by a lens, presently causes it to shrink and contract.

gausapata.
BRODRICII.
troglodytes.

THE RINGED DEEPLET.

Bolocera eques.

(Sp. nov.)

PLATE IX. *Fig.* 6.

Specific Character. Tentacles wholly retractile; white, encircled with a red ring.

GENERAL DESCRIPTION.

FORM.

Base. Adherent, scarcely exceeding the column.

Column. Cylindrical; very changeable in shape; very distensible; surface covered with numerous slightly indented, close-set, longitudinal striæ; studded, on the upper two-thirds, with numerous minute warts, increasing in number to the margin: these are either prominent or level, at the pleasure of the animal, and they have the power of attaching fragments of extraneous matter, which, however, seems rarely exercised. Substance lax and pulpy, with thin integuments. Margin forming a thick parapet, the summit obtusely edged, and notched with close-set denticulations, which are not warts, but are the terminations of the striæ.

Disk. Flat, smooth, with very delicate and inconspicuous radii; outline expansile beyond the column.

Tentacles. Sub-marginal, set in six rows: 6, 6, 12, 24, 48, 48 = 144; short, thick, conical, but versatile in form, in contraction being slender, in distension often ovate, or when this is partial, ovate with a slender point (*mucro*); constricted at foot, and in contraction marked with longitudinal *sulci*, both of which are very readily obliterated; the tip perforate. They are subequal, about an inch and a half in length, and when distended, upwards of one-third of an inch in diameter; are flexuous, and thrown in various directions; are strongly adhesive; they are perfectly and readily retractile, but in a peculiar mode; the margin contracts, till its edges meet over the tentacles, but it never involves itself.

Mouth. Occasionally protruded in form of a wide cone. Two gonidial grooves, each with its pair of tubercles, and its broad, though faintly marked, radius. Lips thickened. Stomach-wall capable of being protruded in great bladder-like lobes.

COLOUR.

Column. A rich light orange-scarlet, rather duller towards the base the striæ marked by slightly paler lines; the warts white, each inclosed in a ring a little deeper than the general hue; the region below the warts studded with much more minute and more crowded whitish specks.

Disk. Pale buff or drab, unspotted; pellucid.

Tentacles. Pellucid white; a broad scarlet ring, bounded below by a narrower one of opaque white, surrounds the middle of each tentacle.

Mouth. Lip as the disk. Gonidial tubercles white. Stomach-wall marked with alternate lines of pellucid and opaque white.

SIZE.

Height of column, when distended, four inches, diameter nearly the same; expanse of flower about seven inches.

LOCALITY.

North Sea: deep water.

The acquisition of the magnificent animal above described, for which I am indebted to the kindness of Mr. D. Ferguson, of Coutham, not only enables me to augment the genus *Bolocera,* and at the same time the British Fauna, with another species, but also makes me better satisfied with the establishment of such a genus. Equal in dimensions to *B. Tuediæ,* and presenting much in common with that species, there are peculiarities in this specimen which compel me to consider it specifically distinct. These are the brilliant hue of the column, its striate surface, the thinness of the integuments, the much feebler sulcation and constriction of the tentacles, and the rings of positive colour which adorn them, together with their power of complete retractation. All these characters make the present species a decidedly nearer approximation to *Tealia.* Indeed, when fully expanded, so remarkable is the resemblance in form, size, and colour, to a fine *T. crassicornis,* that I have little doubt the reason of its having been hitherto overlooked, is that it has been passed over as that familiar species. Yet the minute warts, the (really though slightly) constricted and furrowed tentacles, and the non-retractility of the margin, determine its place in this genus.

The nobleness of its *tout ensemble,* and especially the rings on its many fingers, suggested to me a specific appellation, in allusion to old Rome's coxcomb chivalry, whose gold rings were no less characteristic than their valour.

My friend informs me that the specimen was procured on the 17th of December, 1858, in twenty-eight fathoms' water, about ten miles east of the mouth of the Tees. The fisherman who obtained it (a careful collector) had never seen one like it, though he had been very familiar with *T. crassicornis*, from the circumstance of some hundreds of specimens having been sent to Mr. Teale, from Redcar, when that gentleman was engaged in his important researches into its anatomy. It lived upwards of three weeks with its first possessor, and after that a fortnight with me.

The greater portion of this latter period it passed in a large tank, where it attached itself, expanded and dilated most gorgeously, presenting a grandeur of beauty which all who beheld it could scarce sufficiently admire. But for a few days before its death it loosed the hold of its base, and began to rupture the integuments, displaying the craspeda. Then the stomach-wall protruded, at first in a vesicular manner, and then by the inordinate recession of the lip, so that the plicate and corrugated stomach occupied the whole place of the disk. Then the tentacles lost their power of distension, and resumed their flaccid and contracted condition, when the longitudinal *sulci* became again conspicuous. And so the illustrious stranger died.

I subsequently received another specimen from Banff, in every respect like the former. It survived but ten days.

Tuediæ.

EQUES.

T. crassicornis.

II.

SPECIES DESCRIBED AS BRITISH, BUT WHICH I AM NOT ABLE TO APPORTION TO THEIR TRUE PLACE, FROM THE LACK OF PERSONAL ACQUAINTANCE WITH THEM.

Alderi (Cocks). " Body cylindrical, hyaline, smooth ; numerous grass-green longitudinal striæ ; tentacles twelve, short, obtuse, with a continuation of the green line on the posterior surface of each. Disk and mouth crimson, the latter marked with eight spots of same colour, but much darker; edge of disk entire; suctorials minute, numerous, imbedded." Deep water, off Falmouth.

Pellucida (Cocks). " Body cylindrical, smooth, opalescent; numerous white longitudinal grooves; suctorials minute; tentacles short, filiform, transparent, plain; mouth small; disk circular, flat, crossed by opaque white lines; edge entire." Falmouth.

Yarrellii (Cocks). " Body conoid, hyaline, with twenty-four longitudinal semi-opaque white striæ; suctorials numerous, minute, imbedded. Three rows of tentacles, short, obtuse (rather clavate), spotted all over with white. The ovarian filaments, &c. distinctly seen through the transparent tunics." Falmouth.

Bellii (Cocks). " Body cylindrical, hyaline, spotted with yellow; twelve longitudinal opaque white striæ; mouth bright orange-red; two yellow patches extending from the angle on each side to the base of the tentacles; tentacles twenty, long, filiform, dotted anteriorly, and tipped, with yellow." Falmouth.

Hastata (Wright). " Base adherent to rock; not exceeding column. Column smooth; height about equal to breadth (one inch). Disk hollow, hardly equalling diameter of column. Tentacles numerous; in five or six rows, set close to margin; nearly equal; very conical and short; thickly crowded. Mouth set on a cone; lip tumid, furrowed. Column and disk sienna-brown, or salmon colour. Tentacles light brown, with two white bars across the base, tip slightly white or translucent. Lips orange or brick-red." Berehaven, Co. Cork.

N.B. The above five species seem all referrible to that group of the genus *Sagartia*, which I have provisionally named *Thoe*.

Intestinalis (Fabric.). " Body cylindrical, the upper half suddenly contracted and narrow."—" When contracted, the body seems like two broad rings, of nearly equal breadth, and about half an inch in diameter; when expanded to nearly two inches, the body consists of two cylindrical portions of different dimensions, smooth, pellucid, yellowish; a few longitudinal white streaks; disk not expanded; tentacles about eighteen, filiform, in two rows." (Fleming.) Shetland.

III.

ADDENDA.

Sagartia bellis. The *Act. Johnstoni* of Mr. Cocks is a variety of this species; two specimens have come under my notice.

—— *miniata.* A friend (*E. W. H. H.*) thinks that the *Act. elegans* of Dalyell is this species (see *supra*, p. 100). If so, my name must give place to his.

—— *ornata.* I have taken this at Torquay. It has been also found at Mizen Head, and sent me from Banff. The markings are true to the description, and leave no doubt of its distinctness as a species.

—— *pallida.* Sent me in some numbers from Banff. A considerable colony has also been found at Torquay.

—— *coccinea.* Abundant in deep water, Torbay.

—— *parasitica.* Found, at Jersey, between tide-marks.

Phellia gausapata. I have since seen numerous specimens; the species is quite distinct from *P. murocincta.* A very large specimen has been taken from deep water in Torbay.

—— *picta.* Other specimens have been sent me from Banff. The epidermis is very thin and deciduous; and altogether the species seems intermediate between the true *Phelliæ* and such *Sagartiæ* as *coccinea.*

Adamsia palliata. Some interesting facts concerning this species and its connexion with the Hermit-crab will be found in a paper of mine, "On the Transfer of Adamsia palliata from Shell to Shell," published in the *Zoologist* for June, 1859.

Sphenotrochus Macandrewanus. This has occurred more abundantly than the text seems to imply. Both Dr. Cocks and Mr. Alder inform me of having seen numerous specimens, chiefly from the Cornish coast; and the latter has kindly presented me with two specimens.

—— *Wrightii.* Dr. Wright has sent me a fifth specimen from the same bank as the other four, differing considerably in form from all.

Lophohelia prolifera. I have omitted to mention a fine British specimen, preserved in the Museum of Newcastle; and another mentioned by Landsborough, from Barra, one of the Hebrides.

Balanophyllia regia. Two living specimens have been dredged in Plymouth Sound, by Mr. T. H. Stewart of the Roy. Coll. Surg.

IV.

GEOGRAPHICAL DISTRIBUTION.

In the following attempt to distribute our Sea-Anemones geographically, I divide the whole British Coast into ten provinces, thus (somewhat arbitrarily) defined.

1. The Shetland, including the Orkneys, and Scotland as far as Kinnaird's Head.
2. The North Sea, including the coast from Kinnaird's Head to Spurn Head.
3. The Eastern; from the Humber to the Thames, a flat low shore.
4. The South-east; from the Foreland to St. Alban's Head; chiefly chalk cliffs.
5. The Devonian; from St. Alban's to St. David's Head; a rugged rocky coast.
6. The Irish Sea, to the Mull of Cantyre, including Man, and the Irish shore.
7. The Hebridean, from Cantyre to the Orkneys.
8. The South Irish, from Carnsore Point to Mizen Head.
9. The Atlantic, from Mizen Head to Rathlin Island.
10. The Channel Islands.

A glance at the table will show that the Devonian district is by far the richest in species, including two-thirds of the whole. Next in fecundity to this extreme south comes the extreme north, numbering, however, less than two-thirds of the Devonian total. The Irish Sea, the Atlantic coast of Ireland, and the Channel Isles, each claims about two-thirds of the Shetland total. The province of the North Sea holds about two-thirds of this last number; and then come in succession the South-east, the Eastern, and South Irish, and finally the Hebridean.

These numbers represent, of course, the state of our knowledge rather than the fact. I look for additions in the Devonian province, and far more in the Shetland and Hebridean, of which last I know almost nothing. The Atlantic province will doubtless be farther enriched, and that of the Channel Isles. But I do not look for many species to be added to the North Sea; and few if any to the Eastern and South-eastern provinces;—mud and chalk being essentially ungenial to Sea-anemones.

	Shetland.	Nor. Sea.	Eastern.	So.-East.	Devonian.	Irish Sea.	Hebridean.	So.-Irish.	Atlantic.	Chan. Is.		Shetland.	Nor. Sea.	Eastern.	So.-East.	Devonian.	Irish Sea.	Hebridean.	So.-Irish.	Atlantic.	Chan. Is.
dianthus . .	•	•	•	•	•	•				•	crassicornis .	•	•	•	•	•	•		•	•	•
bellis			•	•	•	•				•	? tuberculata .					•					
miniata . . .	•	•		•	•	•			•		Margaritæ . .	•									
rosea					•				•	•	Churchiæ . .	•	•				•				
ornata . . .	•				•				•		? spectabilis .	•									
ichthystoma .					•						Scoticus . .						•				
venusta . . .					•	•		•	•	•	Mitchellii . .					•					
nivea	•				•	•			•	•	hastata (Pe.) .					•					
sphyrodeta . .	•				•	•			•	•	undata . . .										
pallida . . .	•				•						triphylla . .										•
pura . . .		•							•		? cylindrica . .		•								
Alderi (Sag.) .					•						chrysanthell .					•					
pellucida . .					•						microps . . .					•					
Yarrellii . .					•						callimorpha .					•					•
Bellii . . .					•						carnea . . .					•					
hastata (Sag.) .									•		? Beautempsii .					•					
coccinea . . .	•				•				•		albida . . .							•			
troglodytes . .	•	•	•	•	•	•			•	•	Lloydii . . .						•				•
viduata . . .	•		•	•	•	•			•	•	vermicularis .	•									
parasitica . .		•			•				•	•	sanguinea . .					•	•				
chrysosplen. .					•						augusta . .					•					
intestinalis . .	•										heterocera . .					•				•	
palliata . . .	•				•	•	•		•	•	viridis . . .					•	•		•	•	•
murocincta . .					•						Couchii (Zo.) .	•	•			•	•				•
gausapata . .	•				•						sulcatus . . .					•					
Brodricii . .					•						Alderi (Zo.) .		•								
picta	•										Smithii . . .	•				•		•	•	•	•
fenestrata . .	•										pteropus .	•									
Couchii (Alp.) .					•					•	Taxilianus . .	•									
cereus . . .			•	•	•	•	•	•	•	•	Thulensis . .	•									
mesembry. . .	•	•	•	•	•	•		•	•	•	Macandrewan .					•				•	
Tuediæ . . .	•	•			•		•				Wrightii . .						•				
eques	•	•									arcticus . . .	•									
gemmacea . .					•	•		•	•	•	prolifera . . .	•						•			
thallia . . .					•						Durotrix					•					
Ballii . . .				•	•						regia					•					
coronata . . .					•						? interstincta .	•									
digitata . . .		•			•						Total 75	30	14	7	9	51	20	6	7	21	22

V.

NAMES OF AUTHORITIES EXPRESSED BY INITIALS.

A. B. C.	Miss Church.
A. M. M.	Mrs. Murray Menzies.
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C. K.	Rev. Charles Kingsley.
C. W. P.	Mr. Chas. W. Peach.
D. B.	Miss Barnie.
D. F.	Mr. D. Ferguson.
D. L.	Rev. David Landsborough.
D. R.	Mr. David Robertson.
E. C. H.	Mr. E. C. Holwell.
E. F.	Professor Edward Forbes.
E. L. W.	Mr. E. L. Williams, Jun.
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G. D. (B.)	Professor Dickie.
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G. H. L.	Mr. G. H. Lewes.
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G. J. A.	Professor Allman.
G. T.	Rev. George Tugwell.
H. H. D.	Rev. H. H. Dombrain.
H. O.	Mr. H. Owen.
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J. C. G.	Miss Gloag.
J. D. H.	(A misprint for T. D. H.)
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J. G. D.	Sir John G. Dalyell.
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J. M. J.	Mr. J. M. Jones.
J. P.	Mr. J. Price.
J. R. G.	Prof. J. Reay Greene.
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M. E. G.	Miss Guille.
M. V.	Miss Vigurs.
P. H. G.	Mr. P. H. Gosse.
R. B.	Dr. Robert Ball.
R. C. J.	Prof. R. C. Jordan.
R. H.	Mr. R. Howse.
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T. S. W.	Dr. T. Strethill Wright.
W. A. L.	Mr. Wm. Alford Lloyd.
W. F. S.	Rev. W. F. Short.
W. G.	Rev. Walter Gregor.
W. H.	Rev. Wm. Houghton.
W. M'C.	Mr. W. M'Calla.
W. P. C.	Mr. W. P. Cocks.
W. T.	Mr. Wm. Thompson (Belfast).
W. T. (W.)	Mr. Wm. Thompson (Weymouth).

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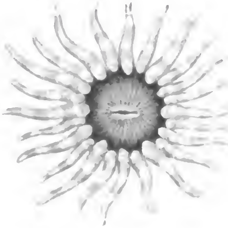

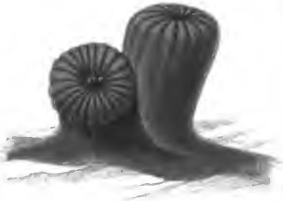

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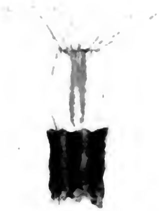

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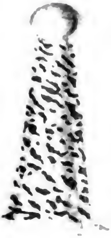

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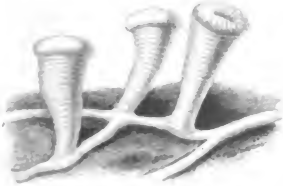

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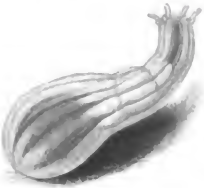

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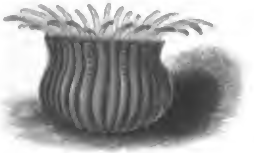

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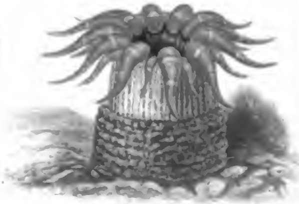

P. H. GOSSE DEL. [illegible] SC.

1 PHELLIA PICTA
2 ZOANTHUS SULCATUS
3 EDWARDSIA CARNEA
4 CARYOPHYLLIA [illegible]
5 ZOANTHUS ALDERI.
6 HALCAMPA MICROPS
7 GREGORIA FENESTRATA
8 PHELLIA MUROCINCTA

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N.B. The names inclosed within brackets are such as are not adopted in this work.

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ERRATA.

Page 10, line 4	Add the qualifying phrase "in general," to the character that there is but a single mouth-angle and pair of tubercles.
Page 11, line 20	
Page 12, second line from bottom	
Page 13, line 10	for "Always," read "generally."
Page 90, line 2	Read "*lowest part of* each tentacle full orange."

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